FEBRUARY 9, 1935

Railway Age

FOUNDED IN 1856

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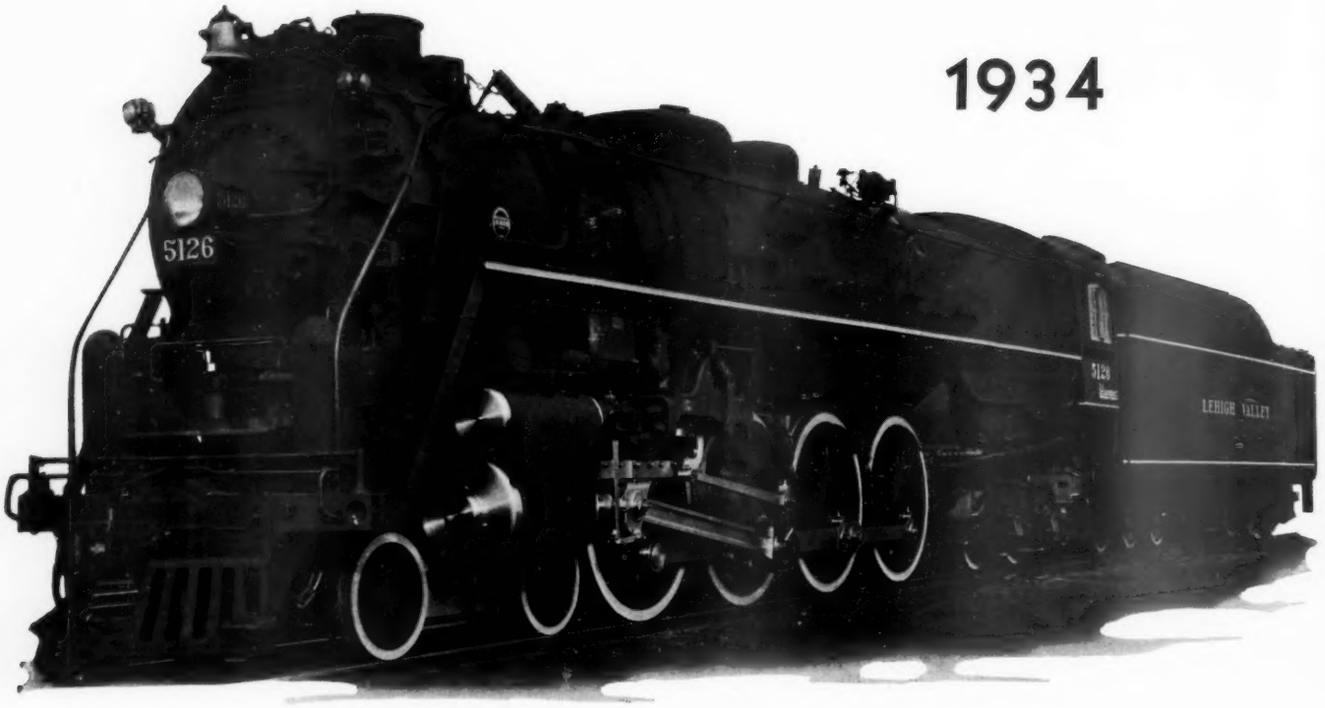
In the editorial pages of this issue appears a description of the New Flying Yankee for the Boston & Maine Railroad and the Maine Central Railroad, and in the advertising pages information by manufacturers whose products or services were used in the design and construction of the train.



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THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U. S. Patent Office

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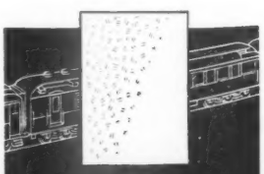

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RAILWAY AGE

Railroad Co-ordination— By Government or Management?

Last week the Interstate Commerce Commission transmitted to Congress the report of Federal Co-ordinator of Transportation Eastman on transportation legislation. It is the result of almost two years of investigation, study and thought by the co-ordinator and his staff. It was prepared with great ability and is a very significant document.

One reason why it is so significant is that there is such an extreme contrast between the Transportation Act which was passing through Congress just fifteen years ago and the legislation now proposed by the co-ordinator. The Transportation Act went into effect on February 28, 1920. Its purposes were to return the railways from government to private operation, and to establish a policy of regulation of their labor costs and rates under which they could be managed in the interest of their security owners, their employees and the public. It declared the policy of Congress to be "to foster and preserve in full vigor both rail and water transportation," and it did not even mention either air or highway transportation.

Transportation Act and Proposed Legislation

Nothing could show better than the co-ordinator's report and recommendations the complete bankruptcy of the policy declared by Congress fifteen years ago, of "fostering and preserving rail transportation in full vigor." The large part of the report devoted to highway transportation emphasizes the then unforeseen increase in such transportation, which is one of the principal reasons why the government's then declared railroad policy has completely failed. There are other important reasons why it has failed. The provisions of the Transportation Act of 1920 establishing a government Railroad Labor Board, which were intended to help maintain reasonable relations between labor costs and rates, were flouted by organized labor and repealed. The government has since regulated railway service, rates and financing, but made no effort to help balance rates and labor costs. The Interstate Commerce Commission never allowed the railways to earn the "fair return" assured. In 1920 and for some years later the principal problem of the railways, excepting that of establishing a reasonable balance between gross earnings and operating expenses, seemed to everybody to be that of expanding and improving their facilities and operation enough to handle an unprecedented volume of traffic that promised to continue to increase. Hence the nature and magnitude of the investment made by them in the 'twenties for which many persons with good hindsight now criticise them.

Proposed Permanent Government Co-ordinator

It is well now to recall the provisions of the Transportation Act of 1920 and the conditions which existed for years both before and after they were passed. They throw light on why there was subsequently such a large expansion of railway facilities. They show that nobody then anticipated, and why nobody then anticipated, the most important developments in the field of transportation that have since occurred. Can anybody now anticipate future developments any better? This question may well be asked in considering, in the trough of a profound depression, what kind of legislation applicable to transportation should be adopted for the future.

The *Railway Age* often has advocated the equalization of regulation of railways and other carriers which the co-ordinator proposes in his report shall be accomplished by adopting comprehensive regulation of motor and water carriers. There is, however, a part of the report which requires special attention because it advocates a permanent increase in the regulation of railways, also. This would be done by perpetuating the position of Co-ordinator of Transportation, extending its jurisdiction over all forms of transportation, and having the President designate a member of the Interstate Commerce Commission to fill the office. The co-ordinator would "keep informed as to the management, operation, and development of all agencies of public transportation, with especial reference to their proper co-ordination, the avoidance of unnecessary

duplication and waste, both now and for the future, and the promotion of a national system of transportation which will meet public needs." He would make recommendations regarding transportation legislation which would be transmitted to Congress by the Commission with its comments. He would be empowered "to enter appropriate orders," subject to review of a proposed control board within the commission, of which he would be a member.

Arguments for the Plan

Mr. Eastman presents some persuasive arguments for this plan. He believes its adoption is needed to effect adequate co-ordination between different groups of carriers. He believes it is especially needed to effect co-ordination between the railways, and reduce wastes due to their competition with one another. The Association of American Railroads was organized recently to solve the internal problems of the railroad industry. Mr. Eastman does not believe it will or can do this without the aid of government pressure. "It is an organization of individual railroads," he says, "maintained and controlled by them. Many railroad executives have an instinctive distrust of co-ordination projects, especially of those which are large in scope. Such projects run counter to their training, and often to their self-interest. The central organization will find it hard to combat this influence. Unaided it will resort to half-measures or drift into inaction. Government activity is needed as a spur to effective action." Elsewhere he says, "the individual handling of many matters by a host of separate and often hostile (railroad) carriers is the thing, above all others, which stands in the way of the best possible service at the lowest cost."

Why Railway Costs Are High

Experience gives strong support to the Co-ordinator's argument; but this experience was before the organization of the Association of American Railroads; and there are strong arguments against his plan. A substantial increase of traffic due to passing of the depression would show that wastes caused by duplications of railway facilities and service are now exaggerated. The effects of the passage of federal and state legislation to establish equal terms of competition between the railways and other carriers as respects regulation and subsidies need to be known before reaching final judgment regarding the railroad capacity and service required in the public interest. Furthermore, it is not possible to agree with the Co-ordinator's conclusion that "the individual handling of many matters by a host of separate and often hostile (railroad) carriers is the thing, above all others, which stands in the way of the best possible service at the lowest cost." The things, above all others, which stand in the way of the best possible service at the lowest cost are, on the one hand, the greatly reduced volume of railway traffic, and, on the other hand, N.R.A. prices and railway wages and working conditions that are excessively costly under existing transportation and economic conditions.

The Co-ordinator's report contemplates equalization of federal regulation of transportation. It advocates no program of equalization as respects subsidies, a subject he has found so difficult and complicated that he has reserved it for consideration in a later report. The proposed permanent Co-ordinator "would give attention to the relation of both labor and capital to the (transportation) industry, to the means of affording proper protection to labor but helping it to avoid unwise policies." The report does not, however, contemplate any definite action or policy of his to equalize the wages and working conditions of employees of competing groups of carriers, or to lighten the burden of the railway payroll. Co-ordinator Eastman recently tried to influence the leaders of the railway labor unions to "avoid unwise policies." Immediately thereafter they adopted a legislative program for vastly increasing the railway payroll.

Authority Without Responsibility?

In every business and industry the problems of personnel, including wages and working conditions, and the problems of securing and satisfying customers are by far the most difficult. The Co-ordinator's report contemplates leaving railway managements to struggle with these most difficult of all problems, while increasing regulation by the addition of managerial functions that would authorize the Co-ordinator and his staff to criticise, and even issue orders affecting the ways in which individual railways, and the organized railway industry, dealt with their operating expenses and provided, rendered and sold their service. Regulation is one thing; management is another. Why should the managements be left the hard duties of dealing with both personnel and patrons, and have their performance of other functions of management made subject to supervision, criticism and orders by persons who do not have to face either the labor union leaders and "grievers" or the customers? Upon what principle is it proposed to give so much managerial authority to a government official and his staff when private management will be held responsible for results in future as it has been in the past?

Problems of Management Should Be Left to Managements

Such a plan is clearly of doubtful expediency and workability. The Interstate Commerce Commission, in its letter of transmittal to Congress, rejected it. "The railroads of the country," it said, "have entered upon this task (of co-ordination) by reorganization and consolidation of their co-operative organizations. They should at least be permitted to demonstrate the efficiency of the organization which they have created." All of the great economies and improvements in railway operation and service have been due to the initiative of

individual managements that have set good examples which have been followed by other individual managements. The problems of railway co-ordination to reduce preventable competitive wastes are important; but the railways have just created an organization with large powers to deal with them; and the exercise by individual managements of initiative in reducing operating costs and improving service will be as essential in future as it has been in the past. The railways would have met outside competition much better heretofore if they had not been hampered by federal regulation which, among other things, fixed their rates on a rigid distance basis just when flexibility in their rate-making was becoming unprecedentedly needed to enable them to meet the long-haul competition of carriers by water and the short-haul competition of carriers by highway. Railway managements are accused of having shown a lack of foresight and adaptability when new kinds of transportation were rapidly developing. Did not their government regulators show even less realization of what was occurring and foresight regarding its effects? What reason does experience afford for believing that any government agency with a small staff could actually be helpful to individual railways and the organized railways in performing strictly managerial functions?

Private enterprise does not flourish under excessive government interference. The government should, in the largest measure that it can, establish equal terms of competition between the railways and other carriers, and give the individual and organized railways more, not less, freedom to work out their own salvation.

Remove Causes of Present Conditions

Equal government treatment of different kinds of carriers as respects regulation and subsidies will result in competition between them that will afford a real test of their respective abilities to render service and make rates that will attract and hold passenger and freight business and handle them profitably or otherwise. Those that cannot compete successfully will be driven from the field, and thus wasteful duplications of facilities and service will be automatically eliminated where they should be eliminated and co-ordination on a basis of economic merit will be established.

Unwise and unfair government discrimination as respects regulation and subsidization and the terrific impact of the depression have caused the present chaos in transportation. The remedy for the condition is the removal of its causes, not a permanent increase of paternalistic government criticism and supervision unaccompanied by government assumption of any participation in the most onerous duties of management or of any responsibility to security-owners, employees or public for results.

Six-Hour Day Would Reduce Railway Employment, Prolong Depression

"Mr. Eastman states that the six-hour day, unless it were established at the expense of labor, would add at least $400,000,000 to railroad expenses. The railroads as a whole have been operating for three years at a deficit after paying all charges, and they are pledged to restore wage rates on April 1, 1935, to the full pre-depression level, which will make them 157 per cent higher than in 1913. The present proposal would increase them at one stroke 33⅓ per cent above that level.

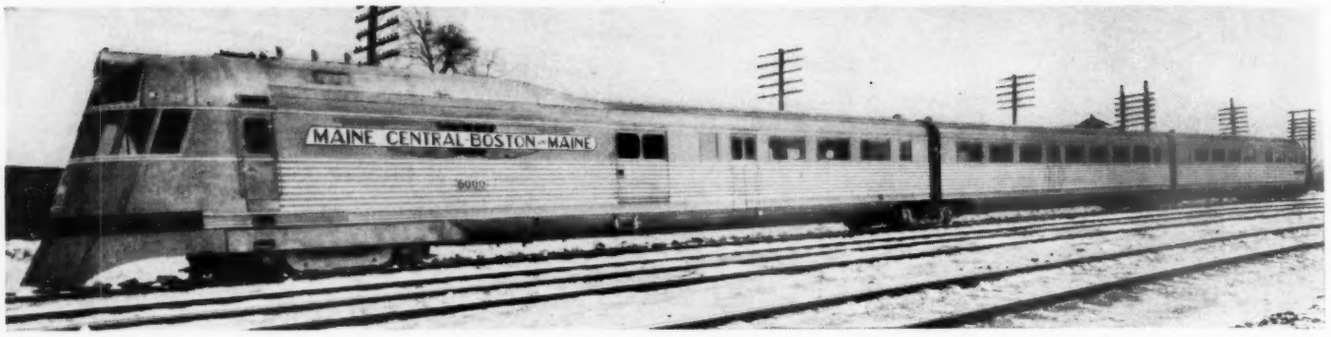
"This proposal is put forward with the claim that it 'would extend a ray of hope to approximately 1,000,000 railway employes who comprise one of the largest units of the national army of unemployed.' But it may be asked what the hope would be worth if rates were increased to cover the $400,000,000 of cost, as would be necessary? Freight rates, even though unremunerative, are 37 per cent above the pre-war average, and have been reduced only about 8 per cent since 1929, while many of the commodities moving over the roads are still cheaper than in 1913, and on the average are nearly one-quarter lower than in 1929.

"This is an instance of a maladjustment in economic relations that is burdening business, diminishing traffic, and blocking recovery. Freight charges enter into all prices, and in many products several times. If the rates should be raised in the effort to obtain another $400,000,000 for labor manifestly there would be further disruption of trade, and further loss of traffic to the roads. How much employment could the railroads continue to give under those conditions? Also, where would the $400,000,000 come from? * * * *

"It is recognized that the proposals for wage increases and spreading work are sincerely advocated by many persons not primarily speaking for labor, who believe that the increase in payrolls would represent an increase in purchasing power. This they believe would lead to an increase in consumption, and go around the circle until the depression was overcome. But this conception confuses money with purchasing power, and gives insufficient consideration to the effects of wages on prices, and to the importance of balance among all costs and prices. Purchasing power originates in the production and exchange of goods and services between the various industries and occupations; the goods and services of different kinds pay for each other.

"There is no source of purchasing power outside of these exchanges. If they are to go on freely, costs and prices must be in equitable relation with other costs and prices, so that the products of each group will exchange equitably. When they do so there is a free flow of purchasing power, and when they do not purchasing power is lacking regardless of the nominal money compensation of each group. Money in the ordinary sense is not a source of purchasing power, but a medium of exchange and a facility of trade; and if money payments made to any group keep the costs of its products out of line, their apparent gain will soon be given up in the loss of sales and employment."

From the Monthly Bulletin on Economic Conditions, Issued by the National City Bank, New York



The "Flying Yankee"

The "Flying Yankee" Arrives at Boston

Self-propelled, stainless-steel articulated unit will meet fast schedules on the Boston & Maine and Maine Central between Boston, Portland, Me., and Bangor

A SELF-propelled, three-section articulated high-speed train of light-weight, stainless-steel construction, with seats for 140 persons, has been completed for the Boston & Maine and the Maine Central by the Edward G. Budd Manufacturing Company, Philadelphia, Pa. This train, known as the "Flying Yankee" and the first of its kind to be delivered to an eastern railway, moved into New England Saturday, February 9, arriving at Boston after a trip from Mechanicsville, N. Y., with a party of railway officers and representatives of the press.

Before going into regular service between Boston, Mass., Portland, Me., and Bangor, the train will be placed on inspection at various points on the Boston & Maine and the Maine Central, plans for which cover several weeks. It will then go into a service requiring a daily round of 730 miles over the lines of the two railroads.

According to the proposed schedule the new train will replace the present steam-train equipment on the Flying Yankee, a train long famous in northern New England. On its present schedule this train leaves Boston over the Boston & Maine at 9:40 a.m. and runs non-stop to Portland, Me., 115 miles distant, in 2 hr. 5 min. From Portland to Bangor over the Maine Central the run of 135 miles requires 3 hr. 50 min., with 14 intermediate stops. Southbound the leaving time at Bangor is 1 p.m. and the train arrives at Portland 4 hr. later. The run is completed at Boston in a total of 6 hr. 20 min. The schedule of the new train, with some slight changes in leaving and arriving times at Boston, is expected to reduce the overall time by 1 hr. 55 min. each way, the schedule between Boston and Portland calling for an average speed of over 65 m.p.h. and that from Portland to Bangor for over 52 m.p.h., including stops.

An additional round trip will be made each day between Portland and Boston, leaving Portland at about 7:30 each morning and returning in the evening, after the run on the new Flying Yankee schedule has been completed.

The new train consists of three body sections carried on four trucks. It is 199 ft. 2¾ in. long, weighs 213,600 lb. when supplied with fuel, water and sand, ready to run, and is driven by a Winton 600-hp. Diesel-electric power plant. It is streamlined with smoothly curved front and rear ends and smooth longitudinal surfaces. Enclosed under-bodies give a tubular cross-section between the trucks and the latter are shrouded at the sides. Wind-tunnel tests at the Massachusetts

The Interior Finish of the Passenger Compartments Is Characterized by the Use of Colors in Harmonious Contrast Without Detail Ornamentation

Institute of Technology and experience with the Burlington Zephyr indicate that, at a speed of 95 m.p.h., the total resistance to motion is reduced to about 47 per cent of that of a train of three coaches of conventional shape, but of the same weight.

The train contains a small baggage compartment, a compact, well-designed buffet, four passenger compartments, a lounge-observation room, toilets, lockers and unusually spacious racks for the storage of hand luggage, in addition to the usual overhead parcel racks and floor space under the seats. How the passenger seating is disposed may be seen on the floor plan.

The interior finish of the passenger compartments is characterized by the use of colors in harmonious contrast without detail ornamentation. The side walls, including the deadlights up to the tops of the windows, and the ends of the compartments to the ceiling, are finished in Waldon green (a deep shade of blue green) with ceilings in ivory. The mohair upholstering of the seats is in mulberry taupe with brown leather arm rests. Drapes of lemon gold, striped with green, are placed at the windows. The dark side color is relieved by two polished moldings of stainless steel about 2 in. wide, extending the full length of each compartment, one over the windows between the side and ceiling colors and the other at the window sills.

The floors are covered with carpet which is meadow green under the seats and sand color in the aisles. In the lounge-observation compartment less color contrast has been employed. The sides are in two tones of deep blue-green, the darker shade being employed below the windows and the lighter on the deadlights. The upholstery of the chairs is also in green. The carpet is the color of cedar, sometimes called henna-rust. The

The Observation-Lounge

The Buffet

solid color is relieved with a 9-in. stripe of a lighter shade extending around the room just in front of the chairs. The window drapes are lemon gold, with horizontal stripes of deep brown. The ceiling finish is old ivory.

The choice and arrangement of colors was worked out through the collaboration of the Art and Color section of the General Motors Corporation. All floors are covered with 5/16-in. cork tile, cemented to the corrugated stainless steel flooring. In the vestibules 3/16-in. linotile is cemented to the cork tiling. Floors in the buffet, lavatories and luggage lockers are covered with ¼-in. battleship linoleum.

The window shades are of Pantasote with an inside facing of a neutral pattern which harmonizes with the color scheme of the interior, the outside facing having an aluminum finish which closely matches the bright stainless-steel exterior of the train.

In the passenger compartments the lighting is indirect, the lights being concealed within longitudinal coves below the ceiling along each side of the car. The coves toward the sides of the car are open and the light reflected from the curved inner surfaces of each cove and against the curve of the ceiling and the side of the car is diffused in a wide angle which reaches completely across the car at the reading height. The illumination on each side of the car is thus received from the lights in both conduits. The exterior of the conduit is blended into the surface of the ceiling by smooth flowing curves. The lighting is designed to produce a minimum intensity of eight foot candles at reading height. The lounge is lighted directly through diffusing glass which covers the underside of long ducts placed along the walls just above the windows.

The seats in the passenger compartments are built on light-weight tubular aluminum frames. The height of the seat and the angle of the seat and back have been carefully chosen for travel comfort. They are built with a clear space 8½ in. high underneath for the stowing of hand baggage. Robe rails for holding overcoats are provided at the backs of the seats.

The buffet is equipped to supply grill service and to serve ice cream and both hot and cold drinks. It occupies a compartment 6 ft. 6 in. long across the center of the first car. In the design of its equipment great ingenuity has been used to provide all the necessary facilities, including ample refrigerator space, electric grills, urns for hot water and coffee, storage for dishes, cupboards for storage of foods, utensils, etc. Service may be provided either at the counter or at the seats in the passenger compartments. Individual trays, which can be attached between the seats, serve as dining tables. These trays are anodized aluminum. Where opposed seats occur at the bulkheads large section tables of black, non-blistering formica may be set up.

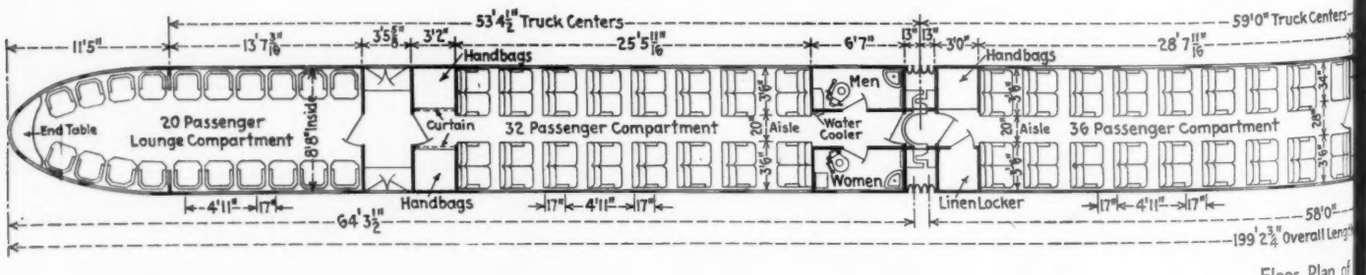
The Car-Body Structure

To a very large extent the entire body structure of the train from floor to roof performs load-carrying functions. The Budd form of truss construction, which employs built-up sections of thin-gage stainless steel, is used. The truss members are generally of box sections formed of deep flanged channels and cover plates joined by the Shotweld system. The 18-8 steel of which these sections are formed has a minimum tensile strength of 150,000 lb. per sq. in. and an elastic limit of 120,000 lb. per sq. in., with satisfactory ductility.

All welding in the structure of the Flying Yankee was done by the Shotweld process, developed and patented by the Edward G. Budd Manufacturing Company. This effects a specific regulation of the pressure, the electric current value and the duration of its flow, thus maintaining unimpaired the strength and the corrosion-resisting properties of the material. The welds will withstand torsion up to 90 deg. They develop a shearing strength of 75,000 lb. per sq. in.

The floor forms a stiff horizontal girder through which end loads are distributed to the side girders. Its structure is made up of a corrugated sheet of stainless steel, the bottoms of the rectangular corrugations of which are welded to a flat sheet and both in turn welded to the longitudinal stringers, of which there are ten across the car. These, in turn, are secured to transverse supports built into the car frame.

In addition to the compressive strength of the floor which, by itself, is sufficient to satisfy R.M.S. requirements for buffing conditions, there is included a center-sill design according to R.M.S. specifications for a 50 per cent heavier train. In the baggage compartment



Floor Plan of

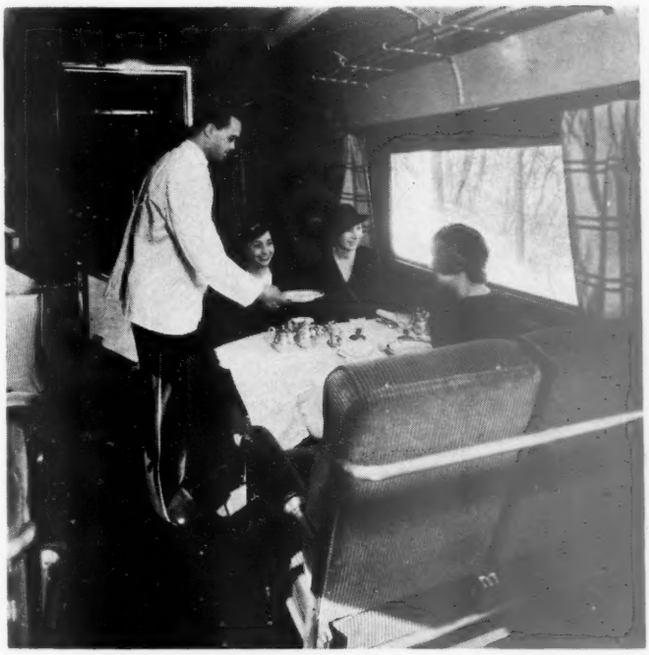
the floor is designed for a loading of 600 lb. per lineal foot.

The roof is designed to assume the entire compression load. It is built up of longitudinal corrugated sheets welded to roof carlines and is locally reinforced at points of maximum stress. The enclosure below the floor is not a primary part of the load-carrying structure, except at the baggage doorway where it is reinforced to serve much the same purpose as the roof. Longitudinal trusses which extend from end to end of each underbody between the sides and center sills serve to add torsional stiffness to the entire structure and are reinforced at the step wells. Between them is a clear space, closed with light hatch covers, in which all piping, tanks, etc., are disposed.

The engine bed, fabricated by Lukenweld, Inc., is a rigid arc-welded structure of steel plate, annealed after completion of the welding. It forms a combination bumper, engine bed and bolster. The material is Lukens Steel Company Cromansil, with a tensile strength of 90,000 lb. and an elastic limit of 70,000 lb., possessing a high resistance to fatigue and shock. It is built into the lower chord member of the side trusses and forms the foundation for the nose structure of the car. All vertical end members are framed into pockets in its top member. In order to reduce the local deflections at the bolster beam of the rear truck and near the articulation castings it was necessary to limit the stresses to a rather low figure. Similarly fabricated members are built into the car structure at these points. Near the articulation castings these members are combined center sills and needle beams which bring the entire side-truss structure into play to resist the bending set up in the center sills and floor structure by the eccentric center-plate loading of the articulation casting.

The nose construction consists of a deep, stiff diagonal member in the vertical center plane of the car which is reinforced with a stiff horizontal arch at the belt rail and with a diaphragm which forms the bottom of the engine-cooling air-intake chamber above the cab windows. This diaphragm consists primarily of two horizontal beams sloping back from the central collision post diagonally to the upper side structure rail. A tie bar across the car resists the spreading action resulting from a blow on this collision beam. These horizontal beams also serve as the top support for the intermediate posts around this end, all of which are reinforced for maximum collision protection.

The articulation castings are tied into the bodies by riveting to the end posts and frame and also to the Cromansil reinforcements at the end of the center sills. No rivets other than those connecting the end-sill castings, engine beds, needle beams and the rear bolster beam to the side frame are used in the car structure. The transverse horizontal arms of the castings extend out only far enough to carry the side bearings, and the load is carried to the side frames through the end truss structure. Through the stiff end structure the reaction from the weight on the truck center is carried to the main side frames. The bending moment due to the eccentric loading at the articulation center pins is distributed to the center sill and the deep vertical end posts of ⅛-in. stainless steel.



Facing Seats at the Bulkheads Provide for Table Service

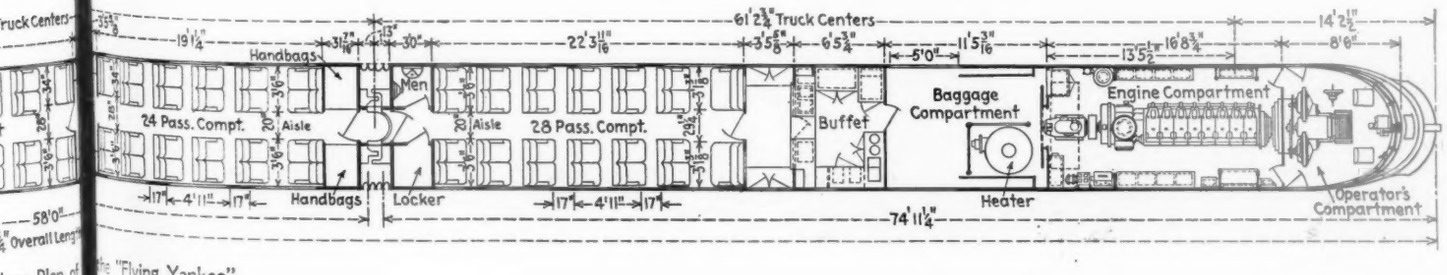
The deadlight panels are finished with smooth surfaces. These laminated panels, some of which are of unusual length, are flexibly attached at the belt and upper moldings, sealed with plastic calking material and secured by means of bolts. They are stainless steel outside, copper inside with a wood lamination between.

The space below the floor level is enclosed with light corrugated sheathing similar to the roofing with light hatch sections under the center. This sheathing is insulated with ½-in. hair felt stitched between two layers of 80-lb. waterproof kraft paper, the outer side of which is cemented to the sheathing, an arrangement which prevents resonance.

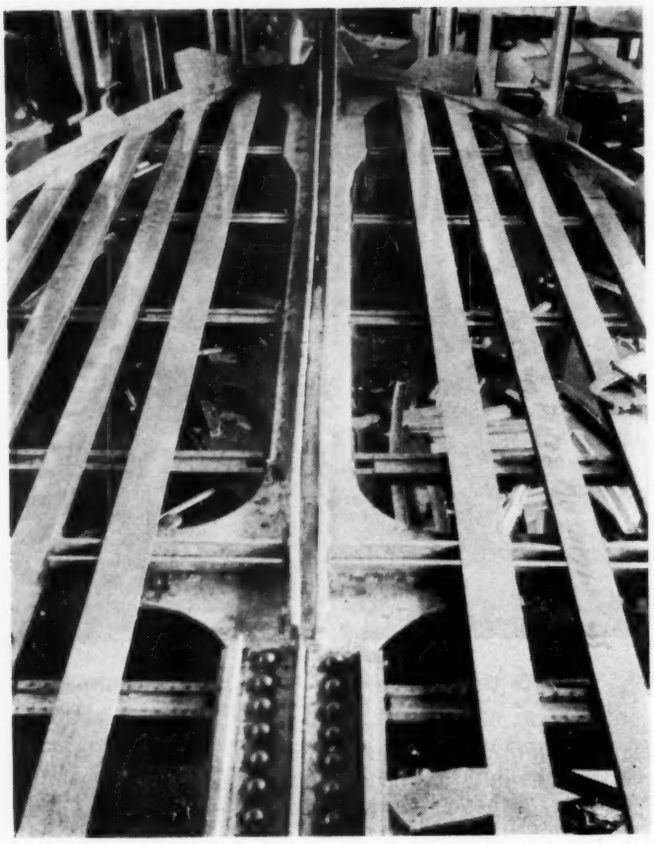
The side walls and roofs of the cars are insulated throughout with a 2-in. Dry-Zero blanket. This material is very light weight and combines very low conductivity with added sound-deadening qualities.

In the coach compartments the side walls and headlining are finished with Masonite panels. The headlining in the lounge compartment is of molded Agasote. The walls of the baggage compartments are of corrugated galvanized sheets. The floors are laid with $\frac{5}{16}$-in. cork tile, cemented to the corrugated steel flooring. In the baggage compartment two layers of heavy roofing paper are applied between the ⅞-in. tongue-and-groove maple and the corrugated steel flooring.

Swing type, double doors serve the passenger com-



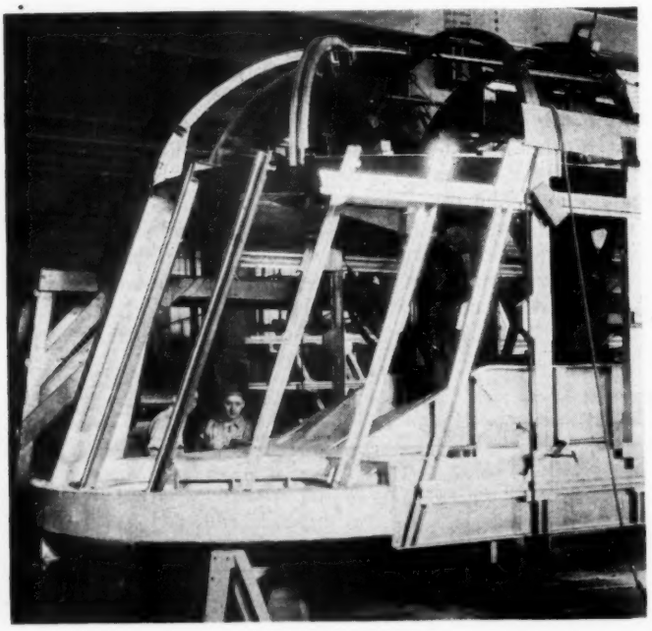
the "Flying Yankee"



Welded Cromansil Bolster and Rear Center Member

partments at the step wells, which are closed by trap doors. The bottom step folds up when the trap is closed and, with the doors, forms an unbroken surface with the adjoining outside sheathing. The side doors in the baggage compartment are of the sliding type, guided in top and bottom tracks to move the door outward into a flush position when closed.

Vestibule passages between the car bodies are enclosed by elastic diaphragms bolted to the ends of the cars.



The Front End of the Train Under Construction

The foot plate is formed by a semi-circular plate, its straight edge secured to the end of one car and the circular edge enclosed in a horizontal recess in the end of the opposite car within which it is free to slide when the cars pass over the curved track. To provide continuity of the outer surfaces accordian type diaphragms are attached between the ends of adjoining cars.

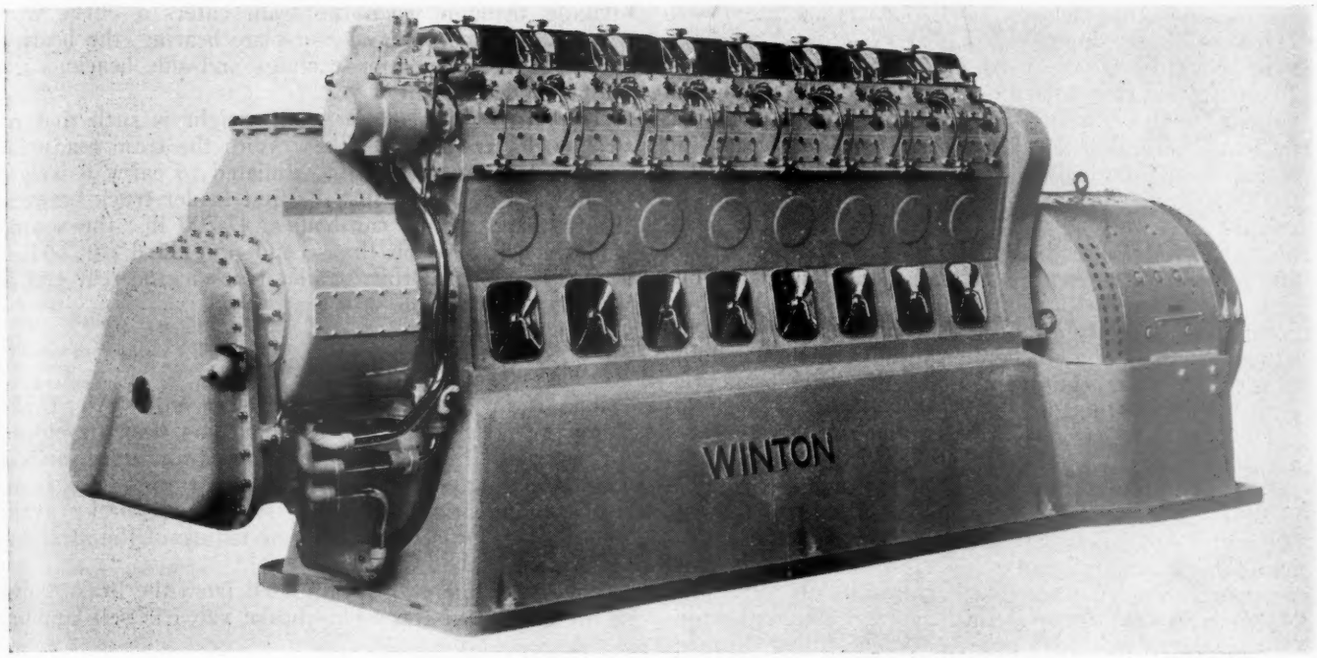
All side windows are flush with the outside surface of the train. With the exception of the doors and the curved sash in the lounge compartment, they are glazed with double hermetically sealed units, as furnished by the Pittsburgh Plate Glass Company, and are made up of two pieces of ¼-in. special Duplate shatterproof glass having ¼-in. dry air space between. In order to overcome the severe weathering a special plastic sheeting is used, which is highly resistant to the ultra violet sun rays. The glass is developed to almost entirely filter these rays. These two pieces of glass are framed with a stainless-steel band to protect the edges. The special features of these hermetically sealed units is that condensation and frost will not form in the air space between the two pieces of glass. Special attention has been given to the re-glazing of the window sash, it being so designed that all this work can be done from the outside of the car.

The Power Plant

The power plant was designed by the Winton Engine Company, a division of the General Motors Corporation. The prime mover is a Winton 600-hp., high compression, two-cycle, 8-in. by 10-in., eight-in-line Diesel engine. Power for all auxiliaries is taken from the engine in excess of its 600-hp. rating at 700 r.p.m. A 75-cu.-ft.-per-min. Gardner-Denver air-compressor is driven mechanically directly from the rear end of the crank shaft of the engine. The weight of the engine is about 22 lb. per hp. which has been obtained by the use of a cylinder block built up from steel plate by arc welding. The nine-bearing crank shaft is carried on main bearing seats fastened to the end of individual cross members cut to form frames for the engine block. Steel-backed, lead-bronze-faced main bearing liners, 6 in. in diameter, are clamped by shimless bearing caps held in place by jack screws acting against the frame arch below the cylinder block. The cylinder liners are of heat-treated, cast iron with air-intake ports encircling each cylinder liner about mid-length. The air-intake manifold formed by the cylinder block connects a twin-rotor scavenger blower on the end of the engine block with the liner ports. The exhaust takes place through four valves in each cylinder head.

The engine-cooling system consists of two radiator sections attached to a removable section of the cab roof, one above either side of the engineroom. Air drawn in through grilles above the operator's cab by two large engine-driven fans is drawn into the engine-room and forced up through the radiator sections and out through a central slot in the roof, through which also extends the engine exhaust pipes. This assures a minimum disturbance of the air stream over the head end of the train and insures a thoroughly ventilated engine room.

The electric equipment, including the main generator, exciter, auxiliary generator and traction motors, was built by the General Electric Company. The main generator is a single-bearing differentially wound machine mounted ahead of the engine and directly connected through a flexible steel disk coupling. The exciter is directly connected to the generator shaft and an extension of the shaft drives a 35-kw. auxiliary generator mounted above the main generator through Day-



The Winton 600-Hp. Two-Cycle Diesel Engine

ton V-belts. The cooling fans are, in turn, driven by V-belts from the end of the auxiliary generator shaft.

The two traction motors are mounted on the front truck. They are series wound machines with a double nose for spring support on the truck bolsters and axle bearings for 7½-in. axles. The armatures have SKF roller bearings and the axle bearings are of the sleeve type.

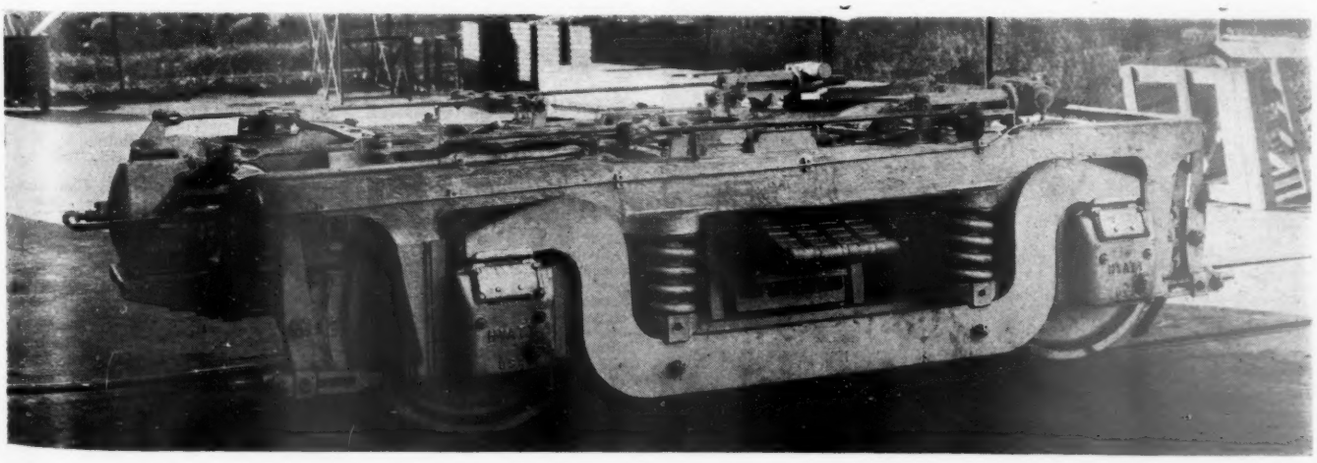
The output of the 35-kw., 76-volt auxiliary generator is furnished to the air compressors, the air-conditioning equipment, motor for train heating boiler, battery charging, lights, control, buffet utensiles, etc. A dynamic relay, combined with inherent regulation, gives a constant voltage regardless of load, over a range of engine speed from idling to full speed, including engine regulation. The 64-volt Exide Ironclad MV AH-25, 32-cell battery rated at 450 amp.hr. is arranged in tiers along the walls of the engine compartment. The weight of the battery is 3,260 lb. It is used for engine cranking in addition to supplying power to the auxiliary circuits.

Motor control consists essentially of one master controller, electro-pneumatically operated motor contactors, and reverser, together with the necessary auxiliary magnetic contactors, switches, relays, etc. The control provides for operation from the front of the train only and for starting and stopping the engine regulating headlights, cab lights, etc. The traction motors are progressively connected in series, parallel and parallel-shunted-field combinations with transfer from one connection to the next higher effected manually.

Trucks

The four trucks are of conventional outside bearing type of construction with various refinements and improvements in design to improve the riding qualities, reduce weight and render quieter operation. They weigh 54,100 lb., exclusive of the gears and motors of the power truck, and all have side frames and bolsters which were furnished by the General Steel Castings Corporation.

The power truck, carrying the weight of the power plant, has 36-in. wheels and hollow-bored axles. The trailer trucks are considerably lighter in construction



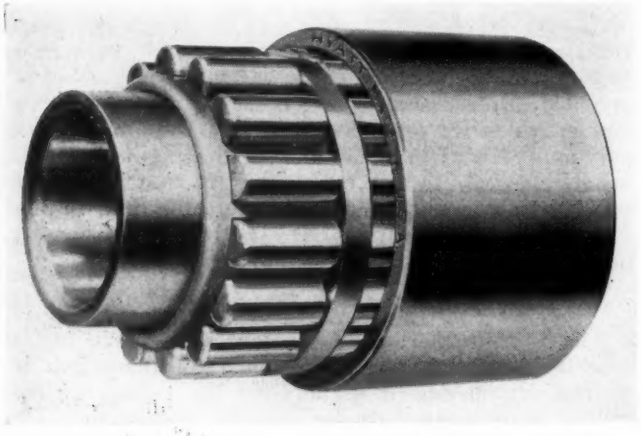
The Power Truck

and run on 30-in. wheels. All journals are fitted with Hyatt roller bearings.

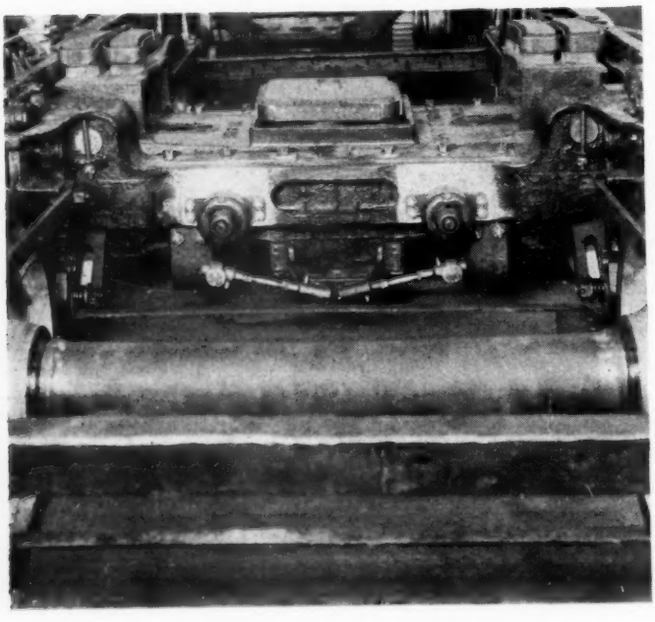
Rubber inserts are used extensively in the trucks. There are inserts under the center plate, in both top and bottom equalizer spring seats and between the ends of the equalizers and journal boxes. The bolster chafing plates are of hardened spring steel, but are insulated from the frame by vulcanized pads of sound-deadening rubber. At the sides of the center plate are strips of rubberized fabric belt material which take fore and aft thrusts and prevent metallic contact and transmission of sound. Rubber thimbles are also provided around the king pin and the center-plate bolts, the latter also including washers. Automotive brake lining is used wherever the members of the truck-brake rigging are likely to rub.

Helical-volute springs are used on the equalizers of all four trucks. These springs consist of the conventional helical outer coil with an inner volute spring in place of the inner helical coil. In order to dampen horizontal oscillations at high speeds Houdaille double-acting hydraulic railroad shock absorbers are installed between the bolster and truck transoms on all trucks. Not only is the dampening a benefit in eliminating uncomfortable side sway, but the double-acting features of the shock absorbers also prevent the bolster from striking through when the train enters a curve with a poor approach. The center-plate bearing, the bearing between the articulation castings and side bearings are all faced with Oilite.

The distribution of the train weight is such that no two trucks are loaded alike. With the train ready for service the power truck is estimated to carry a weight at the rails of 94,000 lb.; the first trailer truck between the first and second car bodies, 47,700 lb.; the second trailer truck between the second and third car bodies, 42,800 lb., and the third trailer truck at the rear end of the train, 29,100 lb.



The Hyatt Roller Bearing Applied on the Truck Journals



Installation of Houdaille Shock Absorbers on One of the Trailing Trucks

Brakes

The train is equipped with New York Air Brake Company's HSC equipment which has been developed for use with high-speed articulated train units and is adaptable to any length of multi-unit train. This is an electro-pneumatic brake with straight-air brake available in case of electric failure, or failure of the straight-air service brake.

The brake operation is initiated from the brake valve in the usual manner. This brake valve is self-lapping,

Equipment and Specialties on the B. & M. New "Flying Yankee"

Builder	Edward G. Budd Mfg. Co., Philadelphia, Pa.
Power plant	Winton Engine Co., Cleveland, Ohio
Stainless steel	Allegheny Steel Co., Brackenridge, Pa. American Sheet and Tin Plate Co., Pittsburgh, Pa. American Steel & Wire Co., Chicago. Eastern Rolling Mill Co., Baltimore, Md. Rustless Iron Corp. of America, New York Sharon Steel Hoop Co., Sharon, Pa. Superior Steel Corp., Pittsburgh, Pa.
Engine-bed assembly, rear bolster and needle beams	Lukenweld, Inc., Division of Lukens Stee Co., Coatesville, Pa.
Forgings	Camden Forge Co., Camden, N. J.
Springs	Atlantic Spring & Mfg. Co., Philadelphia, Pa.
Motor suspension springs	American Locomotive Co., Railway Steel-Spring Division, New York
Truck coil and elliptic springs and clasp brakes	American Steel Foundries, Chicago
Equalizer springs, Helical-volute	Holland Co., Chicago
Truck castings, steel	General Steel Castings Corp., Eddystone, Pa
Side bearings	A. Stucki Co., Pittsburgh, Pa. Amplex Mfg. Co., Detroit, Mich.
"Compo" bearings	Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.
Hand brakes	National Brake Co., Buffalo, N. Y.
Air-brake equipment	New York Air Brake Co., New York
Brake shoes	American Brake Shoe & Foundry Co., New York
Brake lining, Raybestos	Raybestos-Manhattan, Inc., Passaic, N. J.
Roller-bearing journal boxes	Hyatt Roller Bearing Co., Newark, N. J.
Valves	National Pneumatic Co., New York
Wheels and axles	Bethlehem Steel Co., Bethlehem, Pa.
Couplers	McConway & Torley Corp., Pittsburgh, Pa.
Heating system	Vapor Car Heating Co., Chicago
Air-conditioning equipment	Frigidaire Corp., Dayton, Ohio
V-belt drives, Dayton-Roderwald	Dayton Rubber Mfg. Co., Dayton, Ohio
Grilles	Tuttle & Bailey Mfg. Co., New Britain, Conn.
Air compressor	Gardner-Denver Co., Quincy, Ill.
Electric power equipment—Generator, control, traction motors, panels	General Electric Co., Schenectady, N. Y.
Radiator system	Harrison Radiator Corp., Lockport, N. Y.
Electrical supplies	General Electric Co., Schenectady, N. Y. Graybar Electric Co., New York Pyle-National Co., Chicago
Batteries	Electric Storage Battery Co., Philadelphia, Pa.
Head and tail light	Electric Service Supplies Co., Philadelphia, Pa.
Lighting fixtures	Safety Car Heating & Lighting Co., New York
Unilets and steel conduit	Appleton Electric Co., Chicago
Wire and cable	Okonite Co., New York
Shock absorbers	Houdaille-Hershey Corp., Buffalo, N. Y.
Rubber products	Continental Rubber Works, Erie, Pa. Dryden Rubber Co., Chicago Fabreeka Products Co., Inc., Boston, Mass. B. F. Goodrich Rubber Co., Akron, Ohio Goodyear Tire & Rubber Co., Akron, Ohio Quaker City Rubber Co., Philadelphia, Pa.
Oil cups	Casanave Supply Co., Philadelphia, Pa.
Speed recorder	Weston Electrical Instrument Co., Newark, N. J.
Sander equipment	Graham-White Sander Corp., Roanoke, Va.
Horn	Leslie Co., Inc., Lyndhurst, N. J.
Fire extinguisher	Pyrene Manufacturing Co., Newark, N. J.
Calking compound	Ev-Air-Tight Calking Co., Philadelphia, Pa.
Felt	Fidelity Felt Co., Philadelphia, Pa.
Reefer felting	Geo. A. Nicol Corp., New York
Weatherstripping	Midgley & Borrowdale, Chicago
Burlap	R. A. Humphrys' Sons, Philadelphia, Pa.
Insulation	Celotex Co., Chicago Johns Manville, New York Keasbey & Mattison Co., Ambler, Pa.
Asbestos board	Norristown Magnesia & Asbestos Co., Norristown, Pa.

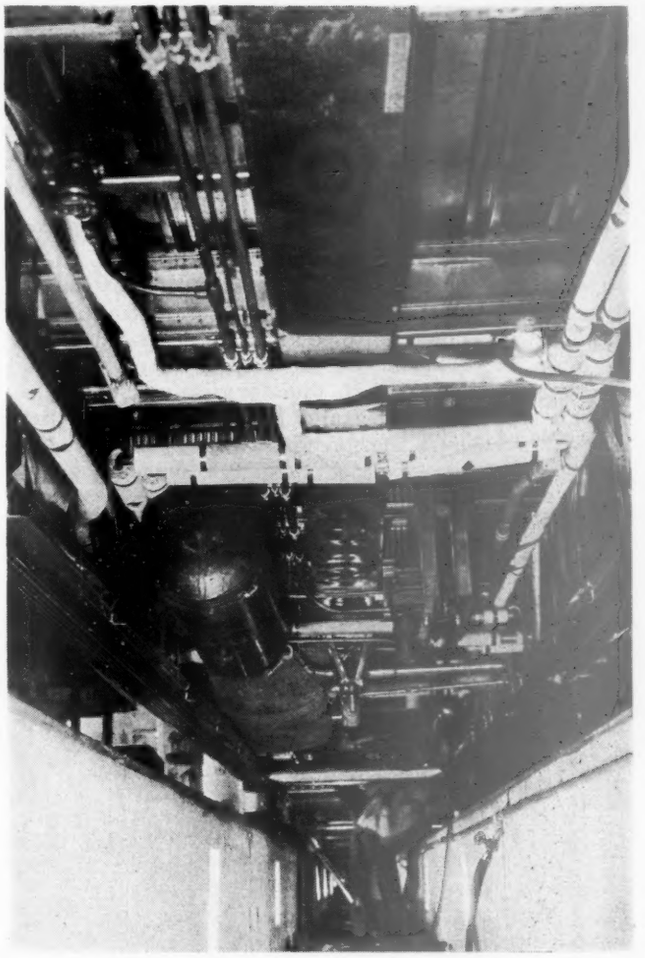
Cork	Armstrong Cork & Insulation Co., Lancaster, Pa.
Tape	L. H. Gilmer Co., Philadelphia, Pa.
"Presdwood"	Masonite Corp., Chicago
Deadlight panel assemblies	United States Plywood Co., Inc., New York
Agasote ceiling lining	Pantasote Co., Inc., New York
Paints	Barrett Co., New York Gilbert Spruance Co., Philadelphia, Pa.
Larcoloid enamel	Larkin Co., Inc., Buffalo, N. Y.
Primer, sizing, cement	Dolphin Paint & Varnish Co., Toledo, Ohio
Window sash	O. M. Edwards Co., Syracuse, N. Y.
Window glass	Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Windshield wipers	Trico Products Co., Buffalo, N. Y.
Wire mesh	Buffalo Iron Works, Buffalo, N. Y.
Wire cloth	Newark Wire Cloth Co., Newark, N. J.
Roller curtains	Railway Curtain Co., Chicago
Curtain rods and fixtures	Kirsch Co., Sturgis, Mich.
Drapery material	Bassett & McNab Co., Philadelphia, Pa.
Furniture	Charles Gerlach, Philadelphia, Pa.
Seats	Sterling Fibre Co., Waltham, Mass.
Seat covering	Massachusetts Mohair Plush Co., Boston, Mass.
Lounge chairs	S. Karpen & Bros., Chicago
Etching	Regal Art Glass & Fixture Co., New York
Basket racks	Rostand Mfg. Co., Millford, Conn.
Carpet	Bigelow-Sanford Carpet Co., New York
Flooring	United Cork Companies, Lyndhurst, N. J.
Buffet service equipment	Angelo Colonna, Philadelphia, Pa.
Buffet tops	Formica Insulation Co., Cincinnati, Ohio
Trays	Aluminum Cooking Utensil Co., New Kensington, Pa.
Cooking utensils	Edison General Electric Appliance Co., Chicago
Diaphragms	Morton Mfg. Co., Chicago
Safety floor plates, steps and cat walk	Alan Wood Steel Co., Conshohocken, Pa.
Door hangers and tracks	Richards-Wilcox Mfg. Co., Aurora, Ill.
Chains, hardware	American Chain Co., Bridgeport, Conn.
Hardware	American Car & Foundry Co., New York The Homer D. Bronson Co., Beacon Falls, Conn. Russell & Erwin Mfg. Co., New Britain, Conn.
Hinges, outside doors, ball bearing	Stanley Works, New Britain, Conn.
Safety chains	Bradlee & Co., Inc., Philadelphia, Pa.
Piping	Kerotest Mfg. Co., Pittsburgh, Pa.
Metal tubing	Titeflex Metal Hose Co., Newark, N. J.
Copper tubing and piping	Chase Brass & Copper Co., Waterbury, Conn.
Water coolers, cup receptacles	Henry Giessel Co., Chicago
Steel tanks	John Wood Mfg. Co., Conshohocken, Pa.
Toilets	Dayton Manufacturing Co., Dayton, Ohio
Toilet paper boxes	Northern Paper Mills, Green Bay, Wis.

thus insuring rapid sensitivity of brake application and release. Operation of the brake valve controls the pressure in a control reservoir with the master relay operating electro-pneumatically in response to this change of pressure. The master relay instantaneously provides operation of the application and release magnets through the train, which admit air to and release air from the straight-air pipe. Straight-air-pipe pressure operates the relay valves which are a part of the control valves located through the train to supply air to and release air from the brake cylinders.

Provision is made for the control of brakes by means of standard brake equipment on steam and electric locomotives, when the train is hauled dead, through the automatic brake. Emergency brake application is obtainable at any time by means of the brake valve, conductor's valve located in each car, safety control or rupture of brake pipe or connecting hose. The deadman control is operated pneumatically either by a foot pedal or by resting the weight of the hand on the brake-valve handle. The release of both of these automatically throttles the engine and causes an emergency application of the brakes. In addition, automatic sanding of the rails occurs during this emergency application.

In order to effect the high rates of retardation required to keep stopping distances from speeds in excess of 100 m.p.h. comparable to present stopping distances of steam trains from a speed of 70 m.p.h., the foundation brake system is designed for an average braking ratio of 177 per cent of light weight and 150 per cent of loaded weight at 100 lb. cylinder pressure. Pressure at full service application is 65 lb. per sq. in. The coefficient of friction of a brake shoe increases as the car speed is reduced. To correct for this and insure smooth stop a Decelakron is used. This device measures through the inertia of a moving weight, the rate of retardation of the train and adjusts the brake-cylinder pressure accordingly.

Aluminum has been used extensively in the air-brake



Piping, Wiring, Tanks and Air-Conditioning Compressors are Accessible Through Hatches in the Underbody

equipment in the interest of weight reduction. This includes brake cylinders, slack adjusters, control valves, relay valves and small reservoirs, etc. The main supply and water raising system reservoirs are of stainless steel.

All air-brake equipment is conveniently located under the floor of the car and protected from freezing and accidental damage by the under sheathing of the car body. Additional protection against failure is afforded by the use of copper air pipes with sweat-on fittings which are free of scale and prevent leaks.

The Heating System

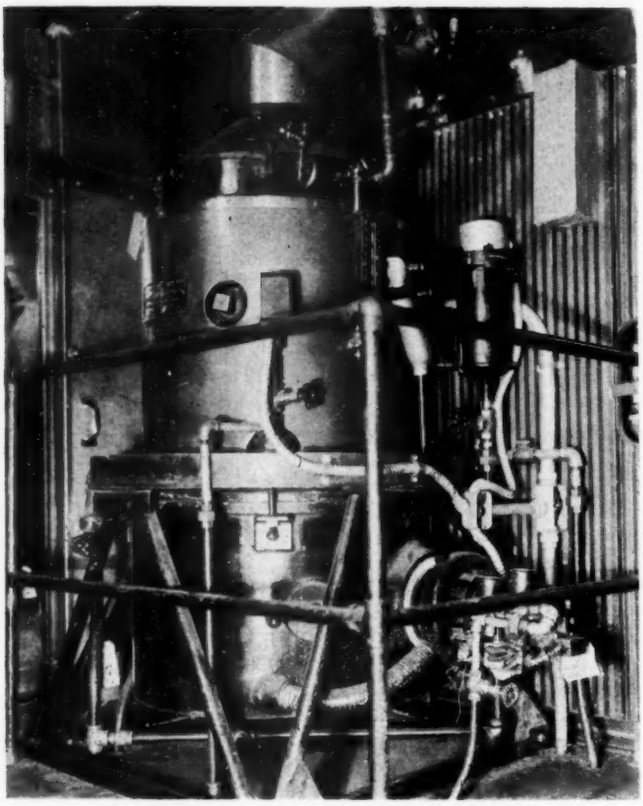
Steam heating of the Vapor type is provided by an oil-fired Peter Smith boiler with an evaporative capacity of 500 lb. per hour at a pressure of 85 lb. furnished by the Vapor Car Heating Company. This boiler is located at the front end of the baggage room in the first car. Its operation is completely automatic once the boiler has been started.

The boiler is fitted with a water-level control, a low-water control and a burner-load control. The water-level and low-water controls are of the electrode type. Current at 110 volts furnished by a small motor-generator set passes from the electrodes to their grounded metal container through the water. If the water drops below the end of the longest electrode, the failure of the current acts to close the oil-supply valve and stop the burner motor. A variation of the water between

the ends of the intermediate and short electrodes serves to cut the feed pump in or out.

For light loads a pressure switch operates automatically to reduce the flow of oil to the burner and the speed of the burner motor, thus maintaining a flame which is little more than a pilot light until such time as the reduction in pressure restores combustion to the full-load amount.

Heat is supplied to the passenger compartments from fin-tube coils in the evaporator units of the air-conditioning system, the fresh and re-circulated air passing through the units to the compartments. Steam is also supplied to a copper fin-pipe along the truss plank near the floor on each side of the compartment. The admission of steam to both radiators is controlled by a separate Vapor regulator and a magnet valve, the latter being actuated by a thermostat. The regulator reduces the steam from 75 lb. to atmospheric pressure and no



The Heating Plant

high-pressure steam is used in the radiating pipes. A thermostat for the control of the air-conditioning radiators is located on a dead-light panel near the center of each compartment, about 5 ft. above the floor. The thermostat for the side-wall radiators is placed near the floor and serves to bring these radiators into action automatically when the heat distribution from the air-conditioning unit is not sufficient to maintain a predetermined temperature at the floor.

In order to reduce the weight of the water carried the radiators in the second car drain into a small sump which is inter-connected with the main boiler feed-water tanks and is automatically controlled by a float valve. As a predetermined low-water level in the sump tank is reached, the float valve admits water from the main tanks and always maintains a certain water level independent of the amount of condensation furnished by the radiators.

As the water level control in the boiler reaches the point where the feed pump is controlled, it automatically starts the pump and sends the water from the second car to the boiler in the first car. During layover period, the entire train can be heated by steam from the terminal supply.

Air Conditioning

The five passenger compartments are completely air conditioned by the Frigidaire mechanical equipment. The compressor and condenser units are housed beneath the floor of two cars, while the evaporators and the distributing fans are built into the roof above the vestibules. This arrangement permits ready accessibility to the apparatus for repair or adjustment.

Fresh air is taken in through the doors into the vestibules and is then passed through filters where it is mixed with the re-circulated air in the proportion of about 1:5.

In the evaporator are located two combination cooling and heating coils—one at either side—and between these are two double blowers which project the conditioned air through centrally located grilles into opposite passenger compartments. The air is returned through grilles at either side of the partitions at the roof. Here, too, are located removable and washable filter pads.

The capacity of the refrigerating system is 5½ tons per car, which becomes more than ample, thanks to the double glazed windows and the heat-reflecting properties of the bright stainless-steel exterior.

In moderately cold weather the overhead coils will keep the compartments comfortably warm without side-wall radiation.

In order to supply stand-by service of the air conditioning from outside sources a special ac.-dc. feature is provided when 220-volt, 60-cycle current is applied, the dc. motor becomes a generator and charges the battery.

When the train is in operation all power is supplied from the auxiliary generator with 77-volt, dc. current. The entire air-conditioning apparatus has been especially designed with a view to light weight and compactness. The entire equipment for the train weighs approximately 4,600 lb. complete.

Copper pipes with sweated fittings have been used for the air conditioning. Furthermore, a great deal of thought has been given toward making all pipe lines and electrical connections readily accessible and to protect them from possible injury.

Lights

The front headlight is a 14-in. 250-watt, Golden Glow unit made by the Electric Service Supplies Company. The back-up light is a 9-in., 40 watt unit made by the same manufacturer. The marker and classification lights are Pyle-National airplane-wind lights in housings made by the Budd Company. These lights are all built into the body of the train.

All lights inside the car and also all auxiliary apparatus are controlled through General-Electric load centers.

Indirect lighting is used in the three forward passenger sections and diffusing glass over the windows in the lounge. Electric Service Supplies Company dome lights are used in the vestibules and Safety deep-bowl units in the buffet and baggage sections.

Main electric wiring circuits are all carried under the floor. A large junction box is located near each end and these boxes are connected by a rectangular metal wiring duct built into the car. Circuits from the ends of the cars to the junction boxes and also branch circuits are carried in thin-wall steel conduit fitted with Appleton Unilets. Okonite insulated wire is used for train-line wiring. Insulated wire for branch circuits was supplied by the National Electric Products Company.

Burlington Demonstrates Economy of Treated Crossties*

A review of the experiences of this road with various preservative processes over a period of 35 years

By H. R. Clarke

Engineer Maintenance of Way, Chicago, Burlington & Quincy

THE first treated ties were used on the Burlington in 1899. In that year a treating plant was built at Edgemont, S. D., which in three years treated 1,150,000 ties, about 50 per cent western yellow pine and 50 per cent fir, using ½ lb. of zinc chloride per cubic foot of wood. In 1902 this plant was moved to Sheridan, Wyo., where 19,900,000 ties have since been treated, of which 13,000,000 were western yellow pine, 6,000,000 were fir and the rest miscellaneous species. Approximately 16,500,000 of these ties were treated with ½ lb. of zinc chloride per cubic foot of wood and 3,250,000 by the Card process, namely, with ½ lb. of zinc chloride and 3 lb. of creosote per cubic foot of wood.

In 1908 the treating plant at Galesburg, Ill., was completed, since which time 33,200,000 ties have been treated there to date. These have been largely red oak, but white oak, southern pine and gum ties have also been treated in considerable numbers, as well as smaller quantities of ties of miscellaneous species. About 10,000,000 of these ties have been treated with ½ lb. of zinc chloride and 22,000,000 by the Card process, with ½ lb. of zinc chloride and 2 or 3 lb. of creosote per cubic foot of wood. Of the ties subjected to the Card process, approximately 500,000 have been treated with ½ lb. of zinc chloride and 3 lb. of water-gas tar. About the same number of southern pine ties have been treated with Grade 1 creosote to a net absorption of five pounds per cubic foot of wood.

In addition to the ties treated at these company-owned plants, about 7,400,000 ties have been treated at commercial plants. These ties were treated largely by the Card and Burnettizing processes, approximately one half by each method.

Has Treated 61,650,000 Crossties

A summary of the foregoing shows that since 1899, the Burlington has used about 61,650,000 treated ties, largely red oak, western yellow pine and fir, with southern pine, gum and other miscellaneous species in smaller quantities. By processes of treatment, the summary is as follows:

Card process—½ lb. zinc chloride, 2 or 3 lb. creosote	29,100,000
Card process—½ lb. zinc chloride, 3 lb. water-gas tar	600,000
Burnettizing process—½ lb. zinc chloride	29,700,000
Straight creosote—5 lb.	625,000
Petroleum oil and creosote—50 per cent each by Vol., 8 lb.	1,300,000
Various	325,000
Total	61,650,000

Treated ties were first used by the Burlington on its lines west of the Missouri river, probably for the reason that while white oak ties were still available for its lines east of the Missouri river, it was becoming difficult to supply them for the entire system, and pine and fir ties were readily available in the western territory. Untreated, these pine and fir ties did not last long enough to justify their use, but treated, they gave very satisfactory service. Treated ties were first used on Burlington lines east of the Missouri river in 1908. During all this time and for a number of years afterward, both treated and untreated ties were used in varying proportions. Since 1921, practically no untreated crossties or switch ties have been used, and the ties in all Burlington tracks are now and have for some time been practically 100 per cent treated.

It will be noted that nearly one half of all of the treated ties used on the Burlington have been subjected to the Burnettizing process. When the practice of using treated ties was begun, there was a definite and immediate increase in annual tie costs, due to the greater cost of the treated ties as compared with the untreated ties formerly used and because there could be no immediate decrease in the number of ties required. The increased investment was justified by the longer life of the treated tie and the ultimate reduction in annual tie costs, but there was necessarily a limit on the expenditure that could be allowed and the zinc chloride treatment was adopted as it was thought that the greatest benefit would be realized by treating the largest pos-

On the Burlington's Three-Track Line, in Suburban Territory West of Chicago

* Abstract of a paper presented before the convention of the American Wood-Preservers' Association at New York

sible number of ties within the expenditure limit authorized. This was effected by the use of the less expensive treatment. Further, although creosote had been used as a wood preservative for many years before the Burlington began treating ties, no definite data were available showing the relative results obtained from the two methods of treating, and the cost of the creosote treatment was materially greater than the zinc chloride process. For these reasons the Burnettizing process was favored.

By 1908 further data were available on the service given by creosoted ties and information was being secured showing the results of the use of zinc chloride-treated ties on the Burlington. The study made at that time brought out facts demonstrating that the additional expenditure for treated ties was justified and that the addition of creosote might be expected to bring about an ultimate saving, especially on that part of the system where rainfall was heaviest. This led to the practice of using zinc chloride-treated ties in the semi-arid territories and Card process (zinc chloride and creosote)-treated ties where the rainfall was heavier, or in a general way, in the use of zinc chloride ties on the lines west and Card process ties on lines east of the Missouri river.

Distribution by Species

There was also a difference in the species of timber used. In the eastern territory it was largely red oak, with some white oak, gum and southern pine, and a small per cent of various species. In the western territory it was largely western yellow pine and fir. Some ties for Eastern lines were obtained locally along Burlington tracks in Illinois, Iowa, Missouri and Wisconsin, but the bulk of the ties came from off-line points in Kentucky, Tennessee, Missouri and Arkansas, and later further south in Alabama and Mississippi. For Western lines, yellow pine was available locally on Burlington tracks and fir was secured from the Pacific Coast.

This standard for species of timber, source of supply and methods of treatment was generally followed until 1903, except during the years 1914 to 1917, inclusive, when, because of inability to secure sufficient creosote at reasonable cost, practically all ties were treated with zinc chloride only.

What have been the results? From 1900 to 1918, inclusive, when practically all the old ties being replaced were untreated, the requirements averaged more than 3,000,000 ties a year, ranging from a low of 2,500,000 to a high of 4,000,000. The average renewals per mile per year ranged from 250 to 370 and averaged not far below 300, equivalent to about 10½ years' life. The renewals made indicate that at times, even in those years, factors other than tie conditions were governing. The ties on which this annual average was made were largely untreated white oak and cedar. In 1919 the annual renewals dropped to 2,200,000 and, with slight yearly variations, averaged about 2,200,000 until 1930, which equals about 165 ties per mile per year or 18½ years' life. The ties on which this renewal average was made were largely red oak, southern pine and gum, treated by the Card process, and western yellow pine and fir treated by the Burnettizing process. The consistency of the renewal averages and the tie condition, as noted in the track, indicated that the renewal cycle had reached the level at which it might be expected to remain.

A Substantial Saving

This extension of service life from 10½ to 18½ years, or an increase of 8 years, and a decrease of nearly 1,000,000 in the number of ties renewed per year, have resulted in a substantial saving. The average life for untreated ties was established largely by the use of white oak and cedar timber. The supply of these species had become depleted, it was more and more difficult to secure the number of ties needed and the cost was steadily increasing. In a few years the available supply would have been exhausted and the price would have become prohibitive. The average life for treated ties was established by the use of red oak, western yellow pine, fir, gum, southern pine and smaller numbers of other species of timber. An ample supply of such species was and has continued to be available. Untreated, they were not suitable for use, but treated they gave better results than white oak and cedar, which had previously been considered about the only satisfactory timber available.

Other factors, in addition to the treatment of ties, must be given some credit for the showing made. Tie plates were used to reduce the mechanical wear. At first they were of inadequate dimensions, but later the size was increased. Better ballast conditions, heavier rail, rail anchors, etc., also contributed. However, as an offset to this stronger track structure, wheel loads, speed and density of traffic increased greatly.

From the figures quoted, it will be seen that the use of treated ties has been an important factor in reducing maintenance of way expenditures on the Burlington. It is difficult, if not impossible, to arrive at any definite figure for this reduction, because the cost of the untreated tie has varied materially from time to time, as have the costs of treatment. Also, it must be remembered that if it had not been for the conservation of timber through treatment and the possibility of using the so-called inferior woods when treated, the supply of timber suitable for use untreated would long ago have been exhausted. Assuming, however, that the supply of timber suitable for use untreated had not been exhausted and that the price had not become prohibitive (neither of which assumptions would have been realized), the comparison would not have been unfavorable to untreated ties. But as we know that timber averaging 10½ years' service untreated could not have been secured, the comparison must be made on another basis.

Studies Continued

As stated above, the standard established nearly 25 years ago provided, in general, for the use of pine or fir ties treated with ½ lb. of zinc chloride on the lines west of the Missouri river and oak, pine and gum, Card process treated with 1½ lb. of zinc chloride and 3 lb. of creosote on the lines east of the Missouri river. This choice of woods was governed by the species of wood most economically available, all factors considered, while the choice of treatments was based partly on the data available and partly on the cost as compared with other processes and methods. The results justified the decision. However, research was not discontinued. The continual study and comparison of tie renewal statistics on all parts of the system developed the fact that zinc chloride-treated ties were not giving satisfactory service on the lines west of the Missouri river, either when compared with renewals of Card process-treated ties on the lines east of the Missouri river or with the expectancy, based on the original studies. Investigation brought out facts that pointed to two causes for this. The first of these is increased moisture. Rainfall in parts of the territory seemed to have increased and as more land was brought under irrigation, submoisture in the track increased greatly in many places. This accelerated the loss of the zinc chloride by leaching. The second was the effect of the extremely dry hot

territories in the mechanical destruction of the zinc chloride ties (that is, they checked, split, splintered and went to pieces, but did not decay) by the chemical action of the salt in concentrated form, on the cellulose in the wood fiber. As a result, it was decided in 1930 to discontinue the use of zinc chloride alone and to treat all ties by the Card process (zinc chloride and creosote).

Observations from Test Tie Sections

This conclusion, based on a review of general tie renewal statistics and repeated inspections of ties in track, was verified by a study of the data developed over a period of 25 years of observation and the record of special experimental lots of ties. In 1909 and 1910, 20 experimental lots of ties, with 1,000 or more ties in each lot, were put in track in scattered locations over the entire Burlington system, on lines of heavy and of light traffic. A number of different species of timber were placed in each lot. Some ties of each species were untreated and the others were given different kinds of treatment. The ties were not picked or selected. They were "run of the yard." These test lots have been followed carefully. An inspection is made each year by the superintendent of timber preservation, accompanied by the district engineer maintenance of way, the division superintendent and the roadmaster on their respective territories. The roadmaster decides that ties shall be renewed. His decision is not questioned. Records are kept and the data compiled by the superintendent of timber preservation showing the reason for removal, the kind of timber, the treated or untreated ties and if treated, the method of treatment. The executive and general officers are given a summary of the results and the conclusions reached in the annual report made by the superintendent of timber preservation. These tests have now been continued long enough to develop information of definite value.

The average life of untreated ties of 20 different species of timber has been found to be 5.6 years, ranging as follows:

Kind	Average Years	Kind	Average Years
Cottonwood	2.9	Tamerack	5.1
Sycamore	3.3	White Elm	5.3
Tupelo Gum	3.5	Loblolly Pine	5.3
Red Birch	3.6	Red Oak	5.3
Soft Maple	3.6	Poplar	5.3
Red Gum	4.1	Hickory	5.5
Hard Maple	4.7	Pin Oak	6.3
Hemlock	4.9	Cyprus	8.3
Beech	5.0	Chestnut	9.7
Ash	5.1	White Oak	11.1

The ties in the test sections were treated with straight creosote, by the Card process or by Burnettizing, using the same species of wood as were put in untreated. The averages established for all kinds of treated timber by the various methods of treating are as follows:

	Actual Average to Date		Estimated Final Average	
	Lines East	Lines West	Lines East	Lines West
Straight creosote	20.9	20.0	26.0	25.0
Card process	17.7	17.4	20.0	19.0
Burnettizing	15.3	14.9	15.3	14.9
Untreated	5.4	5.8	5.4	5.8

From the study of the above data as well as the further scrutiny of tie renewal statistics on the Burlington and observations of tie performance on other roads, confirmed so far as possible by a check of the present condition of about 50,000 test ties of various kinds, that were treated in several ways and have been installed in a number of locations at different times since the first test lots were put in track in 1909 and 1910, it was decided that a further change in treating processes was economically justified.

Changes Recommended

The method of treatment recommended was the Reuping process, using a mixture of 50 per cent creosote and 50 per cent petroleum, with a retention of eight pounds per cubic foot of wood. It was further recommended that all ties be pre-adzed and bored before treatment and that such timber be incised as required it to secure proper penetration. It was proposed also that the size of tie plate for heavy duty lines be increased to 8-in. by 11-in. and provided with a double shoulder, rolled in crown.

The expenditure involved and the ultimate saving that might conservatively be expected were carefully weighed. The expenditure was actual, definite and immediate. The saving was necessarily but a careful estimate and was to be realized in the future. Fortunately, as in 1900, the Burlington still has executive officers with foresight and courage. The capital investment for equipment and machinery was made, the more expensive method of treating ties and the increased expenditure for larger tie plates were authorized. These are now Burlington Lines standards.

We have been supported and even encouraged on by our executive officers to insist on the purchase of ties up to specifications in size and quality. We confidently expect to secure from such ties, well treated and properly protected, a service life of 25 years. If this service life is obtained, the comparison of these 25-year ties (based on 1933 costs) with the 18½ year record established will be as follows:

Annual cost 18½ year tie	$0.1912
Annual cost 25 year tie	0.1642
Annual saving per tie	0.0270

With 39,300,000 ties in track, this saving will amply justify the increased expenditure, just as the practice started in 1899 has been so clearly proved to have been right.

President Urges Centralized Transportation Regulation

WASHINGTON, D. C.

PRESIDENT ROOSEVELT'S ideas about consolidation of federal transportation regulation were outlined somewhat more fully than on previous occasions in an address to Congress on January 31, transmitting a report of the Federal Aviation Commission. He suggested that Congress consider the report together with that of Co-ordinator Eastman and those to be submitted by the Postoffice Department and an interdepartmental committee that have been studying ocean transportation and subsidies. Also, he failed to concur in the recommendation of the aviation commission for a separate air commission, saying that "we should avoid the multiplication of separate regulatory agencies in the field of transportation" and that "in the interim before a permanent consolidated agency is created or designated over transportation as a whole, a division of the Interstate Commerce Commission can well serve the needs of air transportation." He also said:

"As I have suggested on many occasions, it becomes more and more apparent that the government of the United States should bring about a consolidation of its methods of supervision over all forms of transporta-

tion. When the Interstate Commerce Commission was created in 1887 the railroad was practically the principal method of rapid interstate transportation. Since that time this monopoly of transportation enjoyed by the railroad, to a very important degree, has been limited by the development of the automobile and good interstate roads. Recently water transportation by lake, by river, by canal, and by ocean has, largely through the construction of the Panama canal and our inland waterways, definitely brought ships and shipping into the general interstate field. More recently still, air transportation has become an element. All of these developments have changed the general problem of transportation and the concern of the government with them.

"A number of valuable reports have been prepared on these related questions. The report of the Federal Co-ordinator of Transportation has already been submitted to the Congress by the Interstate Commerce Commission. The report deals with the many problems relating to busses, trucks, water carriers, and railroads. Other reports of departmental committees on ocean mail subsidies have been completed. This present report on aviation is a similar source of information and advice concerning transportation by air. I earnestly suggest that the Congress consider these various reports together in the light of the necessity for the development of interrelated planning of our national transportation. At a later date I shall ask the Congress for general legislation centralizing the supervision of air and water and highway transportation with adjustments of our present methods of organization in order to meet new and additional responsibilities."

President Roosevelt also raised a point on which his attitude has not yet been made quite clear by saying that "in the granting of powers and duties by the Congress orderly government calls for the administration of executive functions by those administrative departments or agencies which have functioned satisfactorily in the past, and, on the other hand, calls for the vesting of judicial functions in agencies already accustomed to such powers. It is this principle that should be followed in all of the various aspects of transportation legislation." There have been various suggestions as to a separation of the "executive" and the "judicial" functions of the Interstate Commerce Commission, but no such proposals were made in Mr. Eastman's report. In fact he said that "there is much misunderstanding about the commission's work" and that no classification of its functions as legislative, administrative, and judicial can be made because "there is a mixture of functions." On the other hand the President may have referred only to the proposal to transfer the regulatory functions away from the Shipping Board Bureau of the Department of Commerce and to give the new commission jurisdiction over common carriers in foreign commerce.

The President's reference to an "interim" also had a disquieting effect in some quarters, because this long-delayed transportation program is already getting a rather late start in this session of Congress for such an ambitious and comprehensive program. The President's interjection of the controversial ship-subsidy question into it, because it is proposed to transfer many of the functions of the Shipping Board Bureau to the Interstate Commerce Commission, or whatever body is to be set up as a centralized regulating agency, also tends to load rather heavily a plan which already includes many controversial features.

Prompt action by Congress to clear up transportation problems was urged by the Chamber of Commerce of the United States, through its president, Henry I. Harriman, in a statement commenting on the report of the Federal Co-ordinator of Transportation. The statement says:

"The recommendations of the Federal Co-ordinator of Transportation and the Interstate Commerce Commission make available for public consideration a clear statement of pending transportation issues. A number of their proposals are in accord with views long urged by the Chamber of Commerce of the United States whose members have over a period of years devoted continuing attention to these problems.

"The Chamber welcomes the main proposition of the Co-ordinator and the Commission that remedies for present conditions should be sought by rounding out and improving the system of regulation of transportation agencies under private ownership and private operation. The Chamber, however, can see no reason for the Co-ordinator's further suggestion that government ownership, although not at present to be recommended, offers advantages as an ultimate solution of the transportation problem.

"Reasonable regulation of water and motor carriers and revision of the long and short haul clause of the Interstate Commerce Act, substantially as proposed by the Co-ordinator and approved by the Commission, have repeatedly been advocated by the Chamber's membership. A notable new feature proposed by the Co-ordinator is legislative provision for continuing codes of fair competition in the transportation field, but with administration of such codes transferred from NRA to the new transportation regulatory organization.

"The Chamber has persistently declared that unnecessary and hampering restrictions upon railroad management under existing federal regulation should be eliminated. The proposed overhauling of the regulating body offers an opportunity to do away with such restrictions and to place the regulation of all transportation on a more equitable basis. The Chamber supports a suggestion of the Commission that research and planning activities for transportation should be left primarily to the transportation fields themselves.

"Now that the Co-ordinator has presented his report and the Interstate Commerce Commission has added its comments and recommendations, prompt action on transportation questions should be taken by Congress without further delay."

Bill Introduced in Congress

Eight of the nine bills recommended by Co-ordinator Eastman in his report on a transportation legislative program made public on January 30 were introduced in the Senate (by request) on February 4 by Senator Wheeler, of Montana. The bill omitted was that proposing a modification of the long-and-short-haul provisions in Section 4 of the interstate commerce act. The bills are: S. 1629, the motor carrier bill; S. 1630, the dismissal compensation bill; S. 1632, the water carrier bill; S. 1634, to amend the bankruptcy law in relation to railroad reorganizations; and S. 1631, 1633, 1635, and 1636, to amend the interstate commerce act.

The motor carrier bill was also introduced in the House by Representative Huddleston, of Alabama, as H.R.5262, and seven of the bills were introduced by Chairman Rayburn of the House committee on interstate and foreign commerce. The water carrier bill is H.R. 5379 and the dismissal compensation bill is H.R.5379. The railroad reorganization bill is to be introduced by Representative Sumners, of Texas, chairman of the judiciary committee.

Some comment has been aroused by the drastic nature of the reorganizations contemplated in the bill recom-

(*Continued on page 242*)

Eastman's Labor Protection Plans

Reduced hours opposed—System of dismissal compensation recommended

WASHINGTON, D. C.

WHILE Co-ordinator Eastman's recommendations for a program of transportation legislation, made public on January 30, have aroused much interest and discussion as to the proposals for co-ordinated federal regulation, the report deals with so many phases of the subject that comparatively little attention has been paid to that part relating to "The Protection of Railroad Labor." This section of the report, 58 pages, discussing such subjects as the proposed reduction of work hours, unemployment insurance, placement service, retirement insurance, and dismissal compensation, as to some of which final conclusions are deferred for later reports or to await further developments, indicates that about as many complicated problems are involved in efforts to compensate men who are unemployed and super-annuated as in the more ordinary experience of paying wages for current service. An appendix includes a draft of a bill recommended to provide a system of dismissal compensation for employees displaced by labor-saving co-ordination projects, based on a complicated formula, together with an illustration of its operation which indicates that at first it would cost about as much to pay men dismissal compensation as to retain them in regular employment, although this cost would be rapidly reduced in subsequent years.

To illustrate the proposed system of dismissal compensation, proposed to take the place of the labor restrictions in the emergency act, the report includes an application of the plan to the proposed Greater Kansas City terminal co-ordination project, for which the annual savings are estimated at $2,081,699. Of this $1,400,516, or 67 per cent, would be labor-saving, but the dismissal compensation plan, when applied to the maximum number of employees who might be displaced by the co-ordination, is estimated to cost $1,685,862 for the first year, or 81 per cent of the estimated gross yearly savings, and nearly $300,000 in excess of the first year's saving in labor expense. This would be, however, 71 per cent of the maximum dismissal compensation liability and another 24.2 per cent would be liquidated the second year, leaving 4.8 per cent due thereafter.

The basis for the formula rests on the principle that the dismissed employee shall receive compensation equal to one-half month's earnings for each year of service adjusted for age if he is over 35 and supplemented for low-paid employees.

The developments that are being awaited include the decision of the Supreme Court in the pension case and the extension of federal regulation over other forms of transportation so that they can be brought within the scope of various plans for dealing with labor.

Following are some extracts from the report dealing with the subject of labor protection:

The Protection of Railroad Labor

This subject was discussed briefly under the heading "Railroad Employment" in the first portion of this report, as a necessary part of any plan for the improvement of railroad conditions.

Soon after the Co-ordinator entered upon his duties, his Section of Labor Relations, under the direction of Otto S. Beyer, organized an advisory committee to assist it in its work, made up of specialists in the fields of industrial relations, human problems in industry, and social security. After a thorough review of the railroad labor situation, the advisory committee made certain recommendations with respect to labor protection, especially in connection with co-ordination projects and other labor-saving improvements. They were embraced under the following topics: Merging of seniority rosters; reimbursement of transfer expense; specialized placement service; unemployment benefits; dismissal compensation; retirement annuities; hours readjustments; and limitations on hours and mileage.

In considering the general subject covered by these topics, it is necessary to keep in mind certain practical aspects. The railroad industry is now in severe financial straits and is also meeting widespread and intense competition from other forms of transportation. Its ability to bear additional financial burdens is very limited. There are certain measures for the protection of labor which, however meritorious they may be in abstract principle, cannot be borne by the railroad industry unless they are imposed at the same time upon competitors, or even upon industry generally. An attempt to make the railroads alone carry such a burden would cripple them in the competitive struggle, and railroad labor would lose more than it would gain. In the discussion which follows, the measures which seem to fall within this class will first be considered.

Reduction of Work Hours

The shorter work-day is widely advocated by railroad labor as a means of relieving unemployment. It has been urged, not only to secure railroad reemployment on a large scale, but also to avoid adding to unemployment through the displacement of labor by specific co-ordination projects and other labor-saving improvements.

Whatever may be the merits of a general shortening of hours, it would be impracticable to make piece-meal adjustments here and there to fit the necessities of any particular project. The proposal to use a general reduction of hours as a means of bringing back to the industry thousands of ex-railroad employees rests upon a different basis. Such a reduction is also advocated for a great variety of other purposes. It is claimed that it will stabilize employment and income, decrease fatigue, increase desirable leisure and promote good citizenship, and even that it will serve indirectly to increase purchasing power. In the past it has sometimes been suggested as a way of increasing efficiency, but it is now most urgently advocated for the purpose of making work, and so relieving railroad unemployment.

It may be granted that a limited change in the hours of labor from time to time is a useful device for the stabilization of employment. If the work-day is temporarily reduced in times of low demand, fewer furloughs or discharges are necessary and the hardship of lessened employment falls more evenly upon the entire group of employees. This is the logic of work-sharing, and it is the principle which underlies certain recognized practices in the railroad industry, and in the regulation of hours in other industries under the N. R. A. Thus, the actual work-day on the railroads in 1933 averaged between 7 and 7½ hours rather than the standard 8, and the codes have typically restricted hours still more. This device is a real, though minor, element in a program of stabilization, and its use will prove of value in future periods of low traffic. But, since the burden of work-spreading falls entirely upon labor, its use should be carefully restricted to emergency situations.

This qualified approval does not apply to the proposal to use a permanent reduction in hours for the same purpose. A reduction intended to be permanent exhausts its effect at the beginning. Men are reemployed, and the industry adjusts itself to the new schedule. Once this has occurred, later increases in demand will call for the recruiting of new employees just as before, and later decreases in demand will throw workers out of employment as inexorably as ever. There is no magic in the reduction of hours which would serve to lessen the severity of these fluctuations. The method of permanent hours-reduction, therefore, offers no contribution to a long-time program of stabilization.

In the first place, it is clear that it would be neither possible

nor desirable to make a permanent reduction in hours sufficient to absorb the existing volume of unemployment. The railroad industry in 1933 could provide only about half as many full-time work opportunities as it did in 1923. That, however, is not adequate reason for a permanent shift to a four-hour day. It is too early to despair of an increase in business and traffic which will put many of these men back to work. On the other hand, it is clear that the railroads could not derive from any source enough income to give their employees a decent livelihood on a four-hour basis.

The more thoughtful advocates of hours reduction point out that not even a return of business to predepression levels would assure the re-employment of all idle railroad workers. Many had been displaced by technological advance even before the depression began, and in other instances the basis of employment has been cut away during the last four years. These men, it is said, have lost their jobs for good on the present basis; there is no way of making room for them except by reducing hours.

This situation is emphasized as an argument in favor of a permanent reduction in hours, not only for the railroads, but for American industry in general. In its most extreme form, it may be definitely rejected. To argue that there is only so much work to be done and that every technological advance that displaces labor decreases by just so much the volume of employment is to repudiate both reason and history.

The ability of the people to consume or use new goods and services runs far beyond any opportunity which they have yet had. The real problem is to provide this opportunity. Limitation of production by short hours or in any other way means, as matters now stand, a lowering of the standard of living which should be attainable. Theoretically it is wrong. The difficulty is that no one has yet discovered an adequate means of adjusting consumption to production. Until it is found, some resort to expedients which are theoretically unsound may be necessary.

The problem of technological unemployment is serious. Even where new work is found, it is often work of lower grade with lower pay. The experience of the twenties indicates that displacement can go on more rapidly than reabsorption, even in times of apparent prosperity. It seems idle to hope that the ordinary processes of reabsorption will carry us quickly out of our immediate difficulties. Whatever they might do eventually, not even the most orthodox of economists would expect them to make short work of the present great accumulation of unemployment.

In an economic system which worked perfectly, there would be no present occasion for shortening hours to reemploy the idle. The only motives would be to reduce fatigue or to give employees more leisure for enjoyment and self-cultivation. With respect to the railroads, the claim of undue fatigue under the 8-hour day is seriously raised only for certain specified occupations.

Unemployment Insurance and Placement Service

Studies of the Co-ordinator have developed much information on the nature of railroad unemployment from 1924 through 1933, upon which a report will be made as soon as it is feasible to submit a specific unemployment insurance plan for the transportation industry. Since these studies have been based upon the employment histories of employees in the railroad industry only, the information is most complete regarding the time lost by those employees who eventually returned to service. Probably the greater part of the burden of unemployment has fallen upon employees who have been permanently separated because of the decline in traffic during the depression years. On the other hand, there is no doubt that a considerable amount of unemployment on the railroads whose records have been intensively studied was not reported. It seems probable that this unreported unemployment more than offsets the employment secured in other industries by employees dismissed or on furlough and that, therefore, the data now presented understate rather than overstate unemployment.

Cyclical and Technological Unemployment. The greatest employment ever recorded on the railroads was in the month of August, 1920, when the Interstate Commerce Commission found that 2,197,000 men and women were at work. The reduction in the number of employment opportunities during the calendar year 1921, immediately following this peak, amounted to about 350,000, a larger reduction than in any single depression year since 1929. Between 1926 and 1929, the number of railroad jobs shrank by more than 150,000. The depression transformed this steady decrease into a rapid fall. During the next four years more than 600,000 job opportunities were lost to railroad workers—250,000 in 1930, 220,000 more in 1931, and 140,000 in 1932. The employment trend leveled off in 1933 and moved slightly upward in 1934. Some of these displaced workers found jobs in other industries, but the proportion could not have been large at a time when almost all types of employment were being sharply reduced. Because of the operation of the seniority principle, most were junior men.

Seasonal Unemployment. The employment statistics of the Commission show a pronounced seasonal swing among maintenance of way workers only, as revealed by the chart entitled "Number of Employees, Middle of Month Count." This group included about 400,000 men from 1924 through 1929 and about 200,000 in 1933. The seasonal peak comes in the summer months. Before the depression, from 100,000 to 140,000 more men were employed during the summer than during the low point in January. In 1933 and 1934 the number of employees added for summer work was between 40,000 and 50,000 men. Employment in the maintenance of equipment and stores and train service groups shows a slight seasonal change which runs counter to the trend for the employees on the roadway. For these employees, the peak of employment comes during the fall and winter.

Total Unemployment of Workers Who Remained Attached to the Industry. Those railroad employees who remained attached to the industry have suffered less hardship than those who were permanently separated, but even so, their situation has been bad enough. The average annual earnings of railroad employees, excluding those in executive positions, were 20.4 per cent less in 1933 than in 1929. In 1933, the average annual earnings of these groups, comprising about 98 per cent of all railroad employees, amounted to little more than $100 per month. Fifteen to 20 per cent of all railroad employees in 1933 were earning less than $600 yearly. Short hours and temporary layoffs contributed more to the low incomes of the depression period than did reduced rates of pay. Because of the seniority principle the resulting burden was very unevenly distributed.

The extent of railroad unemployment during the last ten years can be traced in the records of the number of employees who were furloughed, who were discharged or who quit their jobs. This information, obtained from a careful study of the employment histories of 160,000 workers on seven Class I railroads, is summarized in the accompanying two tables.

From 1925 to 1929, six to eight per cent of the employees on these seven railroads were given temporary layoffs. The average duration of these layoffs was about 15 weeks. Both the percentage of men furloughed and the average durations increased during the depression. The low point was reached in 1932, when 19 per cent of all employees received temporary furloughs which averaged 20 weeks. Furloughs of more than one year's duration were fewer in number than the lesser furloughs, but the proportion of men affected increased much more rapidly during the depression. Between 1925 and 1929, about 1.5 per cent of the employees covered by the investigation were laid off each year and were out of service for more than 12 months. In 1932 this proportion had increased to 9 per cent. Adding both types of furloughs together, 28 per cent of the employees of the railroads studied were laid off for periods averaging from 5 to more than 12 months in 1932.

It is significant that the largest occupational groups, maintenance and train service, were the most seriously affected by unemployment. These data help to explain the low earnings of railroad employees during the depression years, and they also show that wage losses due to temporary unemployment are so large that some measure of protection is necessary.

Social Consequences of Unemployment

A special study by the Co-ordinator of railroad employees whose basic rate for the payroll period nearest November 1, 1933, was 35 cents an hour or less, showed that 155,540 employees, or 15 per cent of the total, fell in this class. Full-time earnings of these workers were, therefore, about $750 a year or less. A large proportion were engaged in maintenance-of-way work, and therefore especially subject to the hazard of unemployment. Their full-time earnings were considerably less than is necessary to maintain a reasonable standard of decency and comfort. The losses which many of them suffered due to recurring unemployment threw them far below the minimum subsistence line.

In 1933 the Department of Labor made an investigation of the earnings and standard of living of 1,000 railroad employees during the depression. They were still on the payroll in 1933, and had, therefore, managed to keep their jobs during the depression years. The Summary of Findings of this study vividly depicts the losses which part-time employment had brought to this body of employees.

Necessity for Unemployment Insurance

Under the existing economic organization it is probable that unemployment cannot be completely prevented, nor would it be desirable to attempt to do so. To compel a railroad or any other industrial enterprise to retain employees on its payrolls for whom no work was available would not only be wasteful

but would prevent those industrial shifts that are necessary to economic progress.

Experience abroad has clearly shown that the payment of unemployment benefits to persons seeking work but unable to find it, is the most effective and economical way of meeting the problem. There has been a growing recognition of the significance of this experience to the United States. Payment of unemployment benefits tends to sustain an even flow of consumer purchasing power and gives to wage earners a feeling of security which is directly related to their efficiency of production and industrial morale. The reserve of purchasing power which can thus be carried over from good times aids in preventing a downward swing into deeper and deeper depression.

Moreover, unemployment insurance, in the opinion of most students, can be administered so as to provide incentives for employers to regularize their operations and hence employment. This would be of especial value to the railroad industry. It is also recognized that such regularization and stabilization of business will produce economies in terms of both wealth and welfare which will exceed the cost of the insurance necessary to stimulate it.

Difficulties of Devising an Unemployment Insurance

Although a definite scheme of unemployment insurance for the railroad and general transportation industry can probably be devised in the near future, this does not seem to be practicable at the moment. Apart from the legal uncertainty created by the attack on the constitutionality of the Railroad Retirement Act, decision on which is now pending in the United States Supreme Court, the financial condition of the railroads is such that if they should be burdened with the cost of unemployment insurance while similar requirements were not made of their competitors, the result might well be more rather than less railroad employment. A system of unemployment insurance imposed on the railroads alone would thus defeat its own ends.

There is also now in process of formulation, under the auspices of the Administration, and Congress, a program designed to safeguard employees in industry generally against the major hazards now incident to their employment. Included in this program is unemployment insurance. Any plans for unemployment insurance for the transportation industry must of necessity be in consonance with the system or systems adopted for industry in general. Here again, the situation may be clarified in the near future.

Lastly, federal regulation of the transportation industry is at the moment in a developing stage. It is planned to extend federal regulation to highway, waterway and possibly airway transportation. Pending the final decision on this program, the status of many of the transportation agencies, other than railroads, is not sufficiently well-defined for social insurance purposes. So it appears desirable that the enactment of unemployment insurance laws covering transportation employees should closely parallel the enactment of legislation extending Federal regulation to transportation agencies other than by railroad.

Despite the fact that it is impossible at the moment to devise a system of unemployment insurance in all its details for the transportation industry as a whole, certain principles which should govern such a system are clear. The first such principle calls for the establishment of a national transportation unemployment insurance system rather than a host of separate state systems. Labor relations in the transportation industry, particularly on the railroads, are not conducted on a localized basis. The regulation of all aspects of interstate transportation and the agencies which conduct such transportation, is primarily the function of the federal government.

A second guiding principle is that *all employees* engaged in interstate transportation should be covered by the same insurance system, so far as possible, except perhaps—those whose occupations do not subject them to the hazard of unemployment.

A third principle requires that all agencies engaged in interstate transportation which can possibly be covered, should be included in a national system. That is, the system should not be confined merely to the railroads. Several reasons have already been given for this. In addition it appears that employment in certain of the newer forms of transportation is expanding, whereas railroad employment has been contracting and may continue to do so. This suggests arranging the system of unemployment insurance for the industry as a whole so that the newer forms of transportation will carry part of the load of unemployment which these forms have precipitated in the older branches of the industry.

The fourth principle is that unemployment insurance and old age insurance for the transportation industry ought to be administered by the same body. First of all, the total contributions for these purposes could thus be collected in one payment from each employer in the industry rather than by two payments made to different agencies. Second, the same set of records could be made to serve both purposes. If the benefits to be paid are to have relation to any contributions paid by employees, these records would be the main basis for the allowance or disallowance of claims.

Placement Service

A nation-wide placement service for transportation workers is not only necessary to assist displaced employees in finding new jobs with a minimum of delay and inconvenience, but is also essential to the successful administration of a national unemployment insurance plan for these employees. In view of the special situation which the possibility of substantial labor displacements resulting from co-ordination may create, the question arises as to the advisability of establishing a special placement service immediately for the railroad industry, ahead of the inauguration of an unemployment insurance plan. The answer to this question seems to be in the negative, chiefly because such a placement service, if it were established now, would, in the absence of any other functions, soon find itself swamped with applications for jobs, about which it could do nothing. Should the existing unemployment situation clear up, however, a special employment service for the railroad industry might conceivably be able to help those for whom it had been organized, but not until then.

It would probably be necessary to organize a special employment service for the railroads to begin with, which should be closely integrated with the United States Employment Service and which could be expanded to include other forms of transportation as rapidly as need therefor developed.

Conclusion

It is assumed that federal legislation for industrial workers in general will permit the establishment of a national plan, either for railroad employees or for all employees engaged in interstate transportation. On the basis of this assumption, a tentative plan or plans can be prepared subject to modification in the light, first, of the decision of the Supreme Court in the railroad retirement case; second, of the extent to which federal legislation will go in enlarging the area of federal regulation in the transportation industry; and third, of the unemployment insurance plan which will be proposed by the Administration for industry generally.

Arrangements have been made by the Co-ordinator to prepare such a plan. The details will be worked out in co-operation with the President's Committee on Economic Security in order that the ultimate plan devised may be carefully integrated with the proposals of the Administration for greater economic security for all workers.

Retirement Insurance

At hearings held by committees of both the Senate and House at the last session of Congress, the Co-ordinator opposed the passage of certain retirement insurance legislation on the ground that an exhaustive investigation of the subject, then incomplete, was being conducted at considerable public expense. It was felt that it would be difficult to act wisely on the proposals without benefit of the results of those studies. However, this view did not prevail.

Despite the passage of the Railroad Retirement Act, it was considered desirable to push this investigation to completion, and this has been done. However the Act has since been attacked by the railroads in the court. The issues raised involve the fundamental basis of any retirement insurance system, as well as the powers of Congress: hence it appears inappropriate at this time to comment on controverted matters, and conclusions as to legality would be superfluous in view of the probability of an early opinion by the highest authority. As soon as possible after the decision of the Supreme Court, a full report will be released which will contain valuable and extensive factual material which has been gathered by the Co-ordinator. Certain conclusions will be presented and appropriate recommendations made. Nevertheless, it is deemed desirable to mention at this time the growing age of railroad employees, because of a minor disagreement which arose in the above litigation as to facts, and its connection with certain recommendations made later on regarding a plan for dismissal compensation, designed to alleviate the hardships which accompany the adoption of labor-saving improvements.

The average age of railroad employees is higher, and the proportion of those aged 65 and over is greater than for any other major industrial group. Other conclusions may be drawn from age data collected by the U. S. Census of 1930; but such conclusions would be based on an incorrect use of census materials, and contrary to fact. This question will be dealt with in some detail in the report referred to above.

The age distribution of railroad employees has been rising for some time. No exact measurement can be made prior to

1924, the first year covered by the special data which have been collected. It seems a reasonable estimate, however, that the proportion of railroad employees aged 65 or over increased from 1.13 in 1900 to 2.64 in 1920; and that the median age in the former year was 33.1 and rose to 37.5 in the latter.

From 1920 to 1929, the rate of upward change in age differs very little from the estimates for 1900 to 1920, taking only the end years of the periods into account. The depression has had a marked effect on the average age of railroad employees. Its net effect has been to bring the age distribution to a point on January 1, 1934, which normally would not have been reached until 1938.

These data are presented here, not only because of their bearing on the discussion below of dismissal compensation, but because they indicate the problem of superannuation with which the railroads are faced. An adequate system of retirement insurance can be made to fit in with a program which will enable the railroads to secure benefit from labor-saving improvements, and at the same time it will tend to avoid the danger of too much old blood in the industry.

Limitations on Hours and Mileage

The Advisory Committee recommended that standard maximums and minimums of hours or miles compensated be established for all classes of employees; that as the need for employment changes, hours or miles should be regulated between these limits; and that during periods of unusually low employment, the minimums should become the maximums in order to insure an equitable division of work among the classes of employees concerned. The principle inherent in this recommendation is by no means new in the railroad industry. While existing labor agreements place maximum and minimum limitations upon the hours and miles worked per week or per month, such provisions are neither universal nor uniform.

Both the carriers and their employees should accept the principle of uniform maximum and minimum limits upon hours and miles worked. Only in this way can situations be avoided where some employee groups on certain carriers will be making good earnings, while numerous lay-offs elsewhere make heavy inroads on unemployment reserves. Assuming that a program of dismissal compensation and retirement annuities is to be imposed upon the carriers, it is reasonable to propose that concessions in weekly or monthly limits be made by senior employee groups.

Dismissal Compensation

Dismissal compensation serves three purposes in meeting problems of displacement from labor-saving improvements. It provides a just reward for long service; it compensates the loss of skill and expectancies; and it assists the displaced employee during the interval before a new position is secured. It is in no way to be regarded as a dole.

Many corporations in this country, as reemployment has become more difficult, have been influenced, in establishing dismissal compensation programs, by the need to afford relief to displaced employees to which they are justly entitled. Money is required to insure to employees a respectable livelihood during the difficult period of seeking a new position; to move to another community; to learn a new trade; to set up a small business; or to start a farm.

One justification for assigning the cost of dismissal compensation to the employing industry, where displacement is due to labor-saving improvements, is the fact that such change will result in economies and increased earnings. There is little reason for making the employee through his savings, or the taxpayer through taxes allocated to pay relief, bear all of the cost of labor displacement involved in such improvement. Dismissal compensation places a part of the social cost of lost employment upon the employing corporation, just as the cost of obsolete equipment must be met out of the earnings which improved facilities may augment. Meeting the social cost of rehabilitation not only cushions the impact of that process upon those displaced but establishes a proper regulative control of the rate of change.

Immediate Reasons for Paying Dismissal Compensation

While it may be conceded that dismissal compensation is sound in principle, exception may be taken, on practical grounds, to its specific application to the railroad industry under present conditions. The railroad industry ceased to expand, in number of employees, 15 years ago. A distinct rise in productivity of its labor in the last period of prosperity was accompanied by declining employment. Competitive forms of transportation have made serious inroads upon railroad traffic. Many roads are in precarious financial condition and further cost burdens will further jeopardize ability to maintain credit and keep abreast of the times in new equipment and improvements.

All this is true. The other side of the picture is that there are large opportunities for economies and better service, if the railroads will co-operate more closely with each other and with other forms of transportation, and that the utilization of these opportunities, if they can be combined with a rehabilitation and modernization of properties, service, and rates, will arrest retrogression and enable the railroads to build up traffic, revenues, and employment. If the tide of traffic should rise, these changes might cause little displacement of labor; but otherwise, they would for a time reduce employment. The choice would then be between continued retrogression and a program which would involve some immediate sacrifice to labor, as well as investors, but lead to future gains. The situation is not unlike that which confronted Henry Ford a few years ago, when he found his business slipping. It was necessary to change the type of his car and his methods radically, and this he did with great success, but only at the expense of a transition period which meant sacrifice for both himself and his men.

Any displacement of employees during the transition period, if such a railroad program is carried into effect, can be accomplished with or without dismissal compensation. The immediate financial gain to the railroads would be considerably greater if there were no such compensation. It would be less, if the men were protected in this way, but very substantial gain would remain and it would continually increase as time went on. Displacements without such protection would have deplorable results under present conditions. All things considered, a policy of moderation and reasonable protection to labor is wiser from the railroad point of view, as well as in accord with fair dealing and justice to the employees, and will produce better results in the long run. It is a mistake, also, to suppose that these labor-saving improvements could be accomplished suddenly in any event. Even under the most favorable conditions, the process will be gradual, for much time will be required to work them out.

Section 7(b) is a temporary provision, not adapted by its language to permanent application. Studies which have been made of its possible application to particular situations, even under present conditions, show the many difficulties which would be encountered and the numerous questions which would arise, some of which would probably end in litigation. Plainly, if labor is to be given proper protection by a permanent enactment, a new statutory provision is necessary and one which is better adapted to the desired ends.

Dismissal Compensation Plan Proposed

Before presenting the plan in detail, it is necessary to consider certain questions associated with its application to the railroad industry under the peculiar conditions which now prevail.

The problem is primarily to distinguish between employees who are displaced because of labor-saving improvements, and those who are retired because of permanent recession in traffic. On the other hand, labor reductions due to labor-saving improvements might be temporarily offset by the effect on employment of increasing traffic. The consequence of the changes would not become manifest unless traffic should later recede, whereupon employees would be laid off ostensibly because of declining business. Much displacement, really due to such improvements, might thus be disguised, only to show up later as an apparent result of reduced business activity. Because of this complication, it will be necessary, first, to predetermine by occupational groups or classes the number of employee positions which the plan will save at the time it takes effect, and then provide that any one actually on the payroll at that time and falling within these groups, not to exceed the total numbers stipulated, who is permanently displaced at any time subsequent to the inauguration of the plan, shall be deemed displaced thereby.

Unless an orderly process is established at the outset, enabling the employees through their representatives to participate in the determination of these classes and numbers, the foundation will be laid for much unnecessary opposition as well as for many individual disputes over who was or was not displaced as a result of such plans. For these reasons it appears expedient to provide that the employees concerned, through their representatives, and the railroads proposing any co-ordination project shall agree, if possible, on the maximum number of employees by classes who may be displaced. Failing such voluntary agreement, the matter would be referred to arbitration, as provided in the Railway Labor Act, except that such arbitration would be compulsory.

Another factor in railroad employment, bearing upon displacements because of labor-saving improvements, is the practice of furloughing employees for varying periods. In the event of the inauguration of a labor-saving plan, this process of making temporary adjustments in forces would be aggravated unless some method were devised to segregate those employees who should be considered permanently displaced from those who

are to be returned to service within a reasonable period. This can be done by providing that any employee of an occupational group or class affected by the plan (up to the total number who may be displaced), shall be considered permanently displaced, if, after having been laid off for a specific period, he is not restored to service. The plan proposed provides a test-period of 8 weeks.

But, even with such a test-period, temptation might easily develop to furlough the employees to be dismissed, for the length of the test-period before finally separating them from the service. In order to forestall this tendency, therefore, and precipitate prompt action, it becomes necessary to provide a penalty in the event of furlough prior to separation. This may be accomplished by granting to any employee who eventually finds himself dismissed at the end of a furlough, a benefit, in addition to his regular dismissal payment, of half his previous average earnings per week for every week he was furloughed prior to final dismissal.

Character of Labor-Saving Improvements

In the above discussion the general description "labor-saving improvements" has been used. This description covers a wide range in infinite variety. It becomes necessary to consider the extent to which dismissal compensation should attach to such improvements. The protection to labor given in Section 7(b) of the Emergency Act applies only to reductions in employment "by reason of any action taken pursuant to the authority of this title."

Two questions arise, one of law and the other of practicability. There are those who believe that any provision for dismissal compensation or similar protection to labor which is imposed by Congress must, as a matter of law, be dependent in some way upon the exercise of governmental authority in compelling or promoting or permitting the labor-saving improvement. Protection was, as above shown, so confined in the Emergency Act. The question of practicability arises in connection with the great variety of possible labor-saving devices or improvements, many of them of minor consequence and often adopted for other reasons as well as possible saving of labor. For these reasons, both of which have some degree of merit, it has been deemed wise to confine the provision of dismissal compensation to the larger projects, involving consolidations, mergers, and unification of facilities such as it was the purpose of the Emergency Act to promote, and which require either governmental authority or relaxation of restrictions or are promoted or stimulated by the government. This has the additional advantage that the administrative problem will be much simplified and kept within practical limits.

In the railroad industry, as in all industry, employees are continually being separated from the service through resignation, discharge for discipline, retirement because of age, ill-health, or injury, and through death. These separations are in the nature of normal day-by-day attritions from the force. As already indicated, for obvious reasons employees whose separations fall in the foregoing category would not receive dismissal compensation, although some of them might receive benefits of other kinds. The plan, therefore, contemplates that each displacement quota, so long as it is outstanding, shall be credited with those separations which fall within the class of employees covered and are due to retirement, resignation, discharge, or death.

Superannuated Employee and Dismissal Compensation

Unless some special provision is made to facilitate retirement of employees in the older age groups, in the event of further labor-saving improvements, the net result will be an aggravation of the present superannuation problem. It is proposed to accomplish this purpose by specifically providing that all employees of the group affected by co-ordination, aged 65 or over, shall first be retired in keeping with provisions of the Railroad Retirement Act, or whatever similar Act may apply, before any employee younger in the service may be separated. The proposed plan also provides that dismissal compensation for employees over 60 years of age shall take the form of a life annuity. Treatment of employees displaced when over age 60 must be predicated upon their inability ever again to secure gainful employment. The hiring handicap for employees between 55 and 60 is severe, but less so than for 60 and over. It appears reasonable, therefore, to give employees of this age group the option of deciding whether to take their compensation in a limited number of payments or for life, leaving each to make the best possible individual adjustment.

The seniority system, so universally in effect in the railroad industry, has a far-reaching bearing upon the method which must be adopted for selecting the particular individuals who may be displaced in connection with specific co-ordination projects. In its usual operation this principle confines itself to one railroad only, and on such railroad, as a rule, to a subdivision only of the organization composing the entire personnel.

When, in the past, occasion has arisen to transfer a number of employees to some other part of a railroad system and there fit them into the co-ordinated organization unit, considerable difficulty has been experienced in determining the seniority to which the transferred employees are entitled at their new point of employment. In the case of co-ordination projects involving more than one railroad, this difficulty becomes much more serious.

For reasons already indicated, it is necessary, as the first step to establish the total number of employees for each occupational group, class or craft who may be separated in connection with specific co-ordination projects. Also all employees 65 years of age and over in each such group, class or craft from which employees are to be displaced, are first to be retired before employees less than 65 years may be separated. With these two provisions as a basis, it becomes possible to devise a method, having due regard for the principle of seniority, which will govern the designation of the employees to be separated, as need may arise. This is to be accomplished by enabling all the employees whose work is affected by co-ordination to be transferred to the carrier organization which functions thereafter. Employees thus transferred would be credited in that organization with the same date of entry into service as they enjoyed in their former carrier organization. By this process, new seniority rosters or lists would be constructed of all the employees affected.

For each group, craft or class concerned a separate seniority roster or list would be constructed. The employees to be displaced would then be selected from each such roster, as need would arise; those 65 years of age or over would first be retired; whereupon those youngest on the roster would be separated, each one in keeping with his consolidated seniority standing, until the total separated, after allowing for retirements for other causes, equaled the established quota for the group, class or craft concerned.

Re-employment

Since the proposed dismissal compensation plan does not undertake to provide compensation for unemployment due to seasonal or cyclical declines in traffic, and since presumably every effort will be made to arrange for transfers of employees within the service, so far as these are feasible and in accord with the intent of the law, it is unlikely that any large proportion of employees who are displaced and receive compensation will later return to the service. There will be some such cases, however, and questions as to the seniority rights of such persons will therefore arise. The principle is followed in the plan that the regaining of seniority rights shall be contingent upon repaying in reasonable instalments, without interest, the dismissal compensation received.

The question immediately arises, if dismissal compensation is to cease when the employee is rehired by the carrier (or successor) from which he was separated, why it should not cease if he obtains work from any other carrier, or indeed anywhere else. In theory, no compensation should be paid, if an employee is able to secure a permanent job of a character comparable with the occupation previously held regularly; and if any work is obtained, the compensation should take into account the value of the new job, as compared with the old.

No such provision, however, is now practicable. No similar *plan* applies to industry in general, nor does the other machinery exist which is essential to the smooth functioning of social insurance institutions for all labor in industry. Without such machinery it would be impossible to follow individual cases with sufficient care to determine what the particular compensation in such cases should be. Moreover, this lack of machinery would result in another grave problem when compensation is payable in case of unemployment, but ceases upon employment. Many employees would not only fail actively to seek work, but would refuse it when offered, unless the offer were made by an agency having some intimate connection with the source of compensation.

Safeguarding Employees' Rights in Compensation

It is unlikely that the railroads will voluntarily secure the payment of dismissal compensation, by making capital settlements with a third party who would in turn assume the obligation. Nor would it be sound public policy to require such practice, if it involved, as it probably would, adding certain undesirable elements of costs, sales commissions and insurance company overhead, or trust company fees, to the payments. This is particularly true in view of the possibility of the enactment of permanent social insurance legislation. A precedent for permitting outside agencies to make a profit out of such legislation might be embarrassing.

The payments are given the status of wages in order, first, to make certain that the compensation becomes a charge against

operating expenses and therefore ahead of such charges as bond interest and dividends, and, second, so that the liability cannot be extinguished by a receivership.

In any scheme providing dismissal payments under circumstances which must leave many details to administrative judgment and labor-management negotiations, petty misunderstandings and grievances, resulting in individual disputes, are inevitable. Fortunately the Railway Labor Act, as amended, provides an adequate remedy in Section 3(i), which may be invoked in such circumstances.

Determination of Transfer Expenses. The present Emergency Act, by Section 7(d), directs that means be provided for determining the amount of, and requires the railroads to make just compensation to their employees for, property losses and expenses resulting from the transfer of work from one locality to another in connection with co-ordination projects. The reasonableness of this provision is hardly open to question, provided necessary safeguards are supplied to prevent abuse. It is proposed to retain this provision in the permanent legislation, but to fix $1000 per employee as a maximum beyond which such awards may not be made. Because of the probability of controversy, it is important to provide an orderly method for fixing such losses. It is proposed to do this, if the parties cannot agree, by arbitration.

The Formula For Dismissal Compensation. As already indicated, the amount of compensation payable to an employee, separated from the service should be related to his age, length of service, and pay. Pension rights are based on age, service and pay. It is logical, also, to vary dismissal compensation with these three factors. The more important question, however, is how to combine them.

(a) *Employees over 65.* So far as employees over age 65 are concerned, i.e., those first to be retired, the problem is one of supplying a life income. No particular difficulty will arise in determining what this income should be if the Railroad Retirement Act is sustained, since these benefits would apply uniformly to all railroad employees throughout the country. In the absence of a national retirement plan, the benefits to which displaced employees 65 years or over would be entitled would, if based on existing pension plans, vary widely not only as between railroads but also as between individual employees of the same railroad. It is proposed, therefore, that all employees 65 years or over, separated from the service through co-ordination projects, shall receive annuities on the basis of the formula prescribed by the Railroad Retirement Act.

While that Act enables employees 65 years of age and over to continue in the service for one year at a time up to age 70, when both employee and employing railroad agree thereto in writing, the proposed dismissal compensation plan does not grant this option to employees affected by co-ordination projects. Retirement for such employees would become compulsory at age 65, for the purpose of retiring as many as possible in the superannuated group before displacing younger workers.

(b) *Employees 60 but less than 65.* Although employees aged 60 are not eligible for full retirement annuities under the Retirement Act, most of them would not find new employment if dismissed because of co-ordination. Some arrangement for life income is, therefore, necessary. Employees with over 30 years' service are entitled, under that Act, to a pension for life reduced by one-fifteenth for each year under 65. But why should a displaced employee, 60 or over, willing to work to 65, when he would receive a full pension, be dismissed with only a reduced pension, a right of which he could avail himself voluntarily under the Retirement Act? In order to take care of this group more adequately, whether they have 30 years' service or not, it is proposed to pay them a temporary annuity equal in amount to the deferred annuity beginning at age 65 to which they are entitled under the Retirement Act.

(c) *Employees under 60.* To tie together still further the provisions for dismissal compensation and pensions under the Retirement Act, a formula has been devised for dismissal compensation so that at age 60 it will be large enough to purchase a temporary annuity to age 65. The simple basis for the formula is a commonly-used rule of *one-half month's pay for each year of service.* This takes care of the service factor and is based on the employee's earnings.

Since men over 35 find it increasingly difficult to secure other employment, an age differential for each year of age from 35

Amounts of Dismissal Compensation

Age	Form of compensation	Length of Service 2 yrs.	5 yrs.	10 yrs.	15 yrs.	20 yrs.	25 yrs.	30 yrs.
At $50.00 per Month								
35 and under		100.00	187.50	375.00	562.50	750.00	.....	.....
40	Lump	100.00	201.56	403.13	604.69	806.25	1,007.81	.....
45	sum	100.00	215.63	431.25	646.88	862.50	1,078.13	1,293.75
50	payments	100.00	229.69	459.38	689.06	918.75	1,148.44	1,378.13
55		100.00	243.75	487.50	731.25	975.00	1,218.75	1,462.50
55	Annual temporary	12.97	31.62	63.25	94.87	126.50	158.12	189.75
60–65	annuity	24.00	60.00	120.00	180.00	240.00	300.00	360.00
65	Annual annuity to death	24.00	60.00	120.00	180.00	240.00	300.00	360.00
At $100 per Month								
35 and under		131.25	328.13	656.25	983.69	1,312.50	.....	.....
40	Lump	141.10	352.73	705.48	1,058.21	1,410.94	1,763.67	.....
45	sum	150.94	377.35	754.69	1,132.04	1,509.38	1,886.73	2,264.06
50	payments	160.79	401.96	803.91	1,205.86	1,607.81	2,009.77	2,411.73
55		170.63	426.56	853.13	1,279.69	1,706.25	2,132.81	2,559.38
55	Annual temporary	22.13	55.34	110.69	166.03	221.37	276.71	332.05
60–65	annuity	42.00	105.00	210.00	315.00	420.00	525.00	630.00
65	Annual annuity to death	42.00	105.00	210.00	315.00	420.00	525.00	630.00
At $150 per Month								
35 and under		187.50	468.75	937.50	1,406.25	1,875.00	.....	.....
40	Lump	201.57	503.90	1,007.82	1,511.72	2,015.63	2,519.53	.....
45	sum	215.63	539.07	1,078.13	1,617.19	2,156.25	2,695.32	3,234.37
50	payments	229.69	574.22	1,148.44	1,722.65	2,296.87	2,871.10	3,445.32
55		243.75	609.37	1,218.75	1,828.13	2,437.50	3,046.87	3,656.25
55	Annual temporary	31.62	79.06	158.12	237.18	316.24	395.30	474.36
60–65	annuity	60.00	150.00	300.00	450.00	600.00	750.00	900.00
65	Annual annuity to death	60.00	150.00	300.00	450.00	600.00	750.00	900.00
At $200 per Month								
35 and under		225.00	562.50	1,125.00	1,687.50	2,250.00	.....	.....
40	Lump	241.88	604.68	1,209.38	1,814.06	2,418.75	3,023.43	.....
45	sum	258.76	646.88	1,293.76	1,940.63	2,587.50	3,234.38	3,881.25
50	payments	275.64	689.06	1,378.13	2,067.18	2,756.25	3,445.32	4,134.38
55		292.50	731.25	1,462.50	2,193.76	2,925.00	3,656.25	4,387.50
55	Annual temporary	37.95	94.87	189.75	284.62	379.49	474.36	569.24
60–65	annuity	72.00	180.00	360.00	540.00	720.00	900.00	1,080.00
65	Annual annuity to death	72.00	180.00	360.00	540.00	720.00	900.00	1,080.00

to 60 is added to the basic dismissal compensation determined by this rule. This age differential equals 1½ per cent of the basic amount of the dismissal compensation multiplied by the number of years in age the recipient of the compensation is over 35 on the date of his displacement. In other words, a man 50 years of age when displaced would have his dismissal compensation increased by $50 - 35 \times 1.5 = 22\frac{1}{2}$ per cent.

The low-paid worker who is displaced on account of co-ordination presents still another situation deserving of special consideration. By very virtue of his low pay he will be in a relatively worse position than his higher-paid colleague in the event of permanent separation from the service. To help him out in this predicament it is proposed to credit the low-paid man with a relatively higher per cent of his earnings for purposes of determining his dismissal compensation. This is a well-recognized principle in social insurance. It is applied in the present situation by calculating as follows the share of each employee's earnings to be used in determining his dismissal compensation:

75%	of	the	first	$ 50	of	his	monthly	earnings.
56.25%	"	next	$100	"	"	"	"	
37.5%	"	"	$150	"	"	"	"	

These percentages correspond exactly with the percentages established by the Retirement Act for varying the pension benefits of employees in relation to their average monthly earnings. The lower the monthly earnings of the pensioner, the higher his pension in relation thereto.

The net result of this integration of methods is to assure an employee aged 60, for any salary or service, dismissal compensation based on the cost of a temporary annuity to age 65, equal to the annuity the employee is entitled to at age 65 under the Retirement Act.

The accompanying table will illustrate the amount of dismissal compensation which would be paid to employees of differing age and length of service whose average monthly earnings have been $50, $100, $150, and $200, respectively. Most of the employees on the railroads who would be affected by labor displacement as a result of co-ordination fall within this range of wage income.

(d) *Fixing a Minimum.* As it became more and more necessary for the railroads in recent years to reduce expenses, the wage income of large numbers of low-paid workers has suffered through short time and demotion. Since dismissal compensation is a factor of average monthly earnings as determined by the employee's service period, i. e., number of months during which he actually received compensation, it is evident that employees low in the scale of wage income who have been dividing time in the interest of maintaining employment would be unduly penalized, should the proposed dismissal compensation scheme not provide a minimum benefit. This minimum has been set at $100. No employee eligible for dismissal compensation, in other words, may be dropped with a benefit less than $100—a small sum at best to carry any man until he secures a new position.

(e) *Optional Methods of Compensating Employees Between 55 and 60.* Dismissed employees between 55 and 60 years of age also present a special problem which makes it desirable to give such employees the option of receiving their dismissal compensation in the form of a temporary annuity payable to 65 or prior death, rather than in the form of a lump sum payment or instalments. The present value of the temporary annuity proposed for these employees is based on the dismissal compensation to which they are entitled, as determined by the formula previously described, using 3½ per cent interest and mortality rates as established by the Combined Annuity Table.

The re-employment prospects of employees between 55 and 60, while not quite so unsatisfactory as those over 60, are, nevertheless, bad. Age 60 is considerably over the usual hiring age in industry generally. On the other hand, the dismissal compensation which many would receive, especially after fairly long service, amounts to a sum, which, when applied as proposed, will net many of them a subsistence income until such time as they are permanently pensioned. For example, a man 55 years of age whose average earnings have been $200 per month and who has had 30 years' service, would be entitled to an annual temporary annuity to age 65 of $569.24, almost $50 per month.

(f) *Method of Payment in General.* As just explained, employees aged 60 and over are to be paid temporary annuities monthly until age 65, when they become eligible for full pensions. Employees aged 55 but less than 60 have the option of receiving temporary annuities to 65 or dismissal compensation. But a word of explanation is in order in regard to the method for paying compensation to those employees who do not receive it in the form of annuities. The proposal is to grant periodic payments equal to one-fourth of the basic earnings, twice a month until the benefit has been paid in full. This will amount to one-half the average rate of pay. Provision, however, is made that if an employee shows sufficient cause he may receive his compensation in a lump sum. This provision is included so that an employee may buy a farm, start some form of independent business, or move to an area of greater business activity.

It would be well for an employee to be told when dismissed that the railroad industry no longer needs him, so that he might start at once the process of readjustment. Payments ought, therefore, to begin the first or fifteenth of the month following the date of dismissal. Unfortunately, in many cases it is impossible to know at the time of dismissal whether the lay-off is permanent or temporary. A carrier may temporarily furlough an employee for eight weeks without compensation, but if the employee is not returned to employment at least equivalent to 32 hours a week he is entitled to receive dismissal compensation. Moreover, the carrier must pay the employee so dismissed additional compensation equal to half his basic earnings adjusted for the length of his furlough. This penalty is provided so that carriers will not retain employees in the industry in the vain hope of being reemployed.

Employees who receive their dismissal compensation in the form of annuities will be paid up to 65 or prior death. No compensation will be given to their dependent heirs, since in figuring the amount of annuities a discount has already been made for the likelihood of death prior to 65. On the other hand, employees receiving periodic or lump sum dismissal payments should have the right to transfer their compensation to their dependent heirs in case of death, since no mortality discount has been used in calculating the amount of compensation. Since all the dismissal payments will be paid by the railroad, it seems advisable to have death benefits paid only to dependent heirs.

Reasonableness of Dismissal Compensation Benefits

As previously indicated, the basis for the formula by which the foregoing dismissal benefits are determined, rests on the principle that the dismissed employee shall receive compensation equal to one-half month's earnings for each year of service adjusted for age if he is over 35, and supplemented for low-paid employees. It may be asked how reasonable this basis is in the light of comparable dismissal compensation schedules as well as in the light of the savings which would follow co-ordination.

There are attached to this report, in the form of appendices, two studies which bear on this phase of this subject. Appendix III concerns itself with dismissal compensation experience in the United States and also abroad, while Appendix IV applies the dismissal compensation plan herein proposed to a specific co-ordination projects which was far enough advanced to permit the selection of the particular employees who would be displaced and the calculation of the exact compensation to which each one would be entitled upon dismissal.

The information supplied by the study of dismissal compensation here and abroad furnished the basis for comparing the proposed dismissal schedules with benefits that have been paid under other schemes; while the second study, dealing with the dismissal compensation obligations which would be assumed in a concrete case, gives an indication of the reasonableness of the benefits proposed in relation to the savings which should follow through co-ordination.

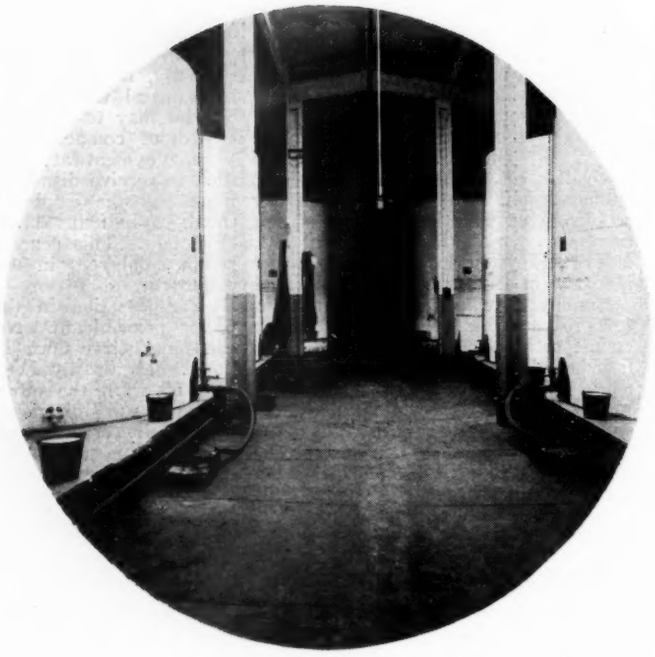
Company, trade union and legislative plans for dismissal compensation, both in this country and abroad definitely show that earnings and service are practically universal as bases in determining the amount of such compensation. In the more developed plans, age is also used, especially when the scheme is carefully integrated with the pension program. Of course many of the plans offer little more than notice or a dismissal "tip." Such plans are hopelessly inadequate at a time when millions are unemployed. There are others, however, which grant one month's compensation for each year of service. Notable in this class is the plan included in the British Railways Act, 1921, which was provided to protect the employees when the British railroads were consolidated into four comprehensive systems. Many of the foreign laws have benefits ranging from one-half to one month's earnings for each year of service.

Perusal of Appendix IV, which shows how the dismissal compensation plan would work out in practice, indicates that in the case of the proposed Greater Kansas City terminal co-ordination project, dismissal rates range from a minimum of $100 to a maximum of $5,217. The minimum amount would be paid to a 29-year-old switch-tender employed by the Missouri Pacific Railroad, who has been three years in the service, with average monthly compensation of $11. The maximum payment would be made to a 59-year-old yardmaster employed by the Wabash, who has been 33 years in the service, with average monthly compensation of $210.

The average payment for all employees who might con-

(*Continued on page 244*)

U. P. "Streamlines" Supply Work



In the Oil-House at Omaha

Organizations remodeled to reduce clerical detail and speed action — Orders for routine materials eliminated

CONTEMPORANEOUSLY with developments directed to reduce the weight and increase the speed of railroad trains, the Union Pacific has been quietly remodeling its supply machinery by changes in methods and organization, which, while not as easily discerned as recent changes in rolling stock, have been designed to introduce further economies and speed in supply service. By a gradual transition, dictated by changed conditions and permitted by corporate realinements, a better supply machine has been produced by pulling down walls between the purchasing and stores departments, pooling clerical operations and further consolidating the stock on the several units forming the system. Divisional stores have been eliminated.

Prior to these changes, the purchasing organization consisted of a general purchasing agent at Omaha, Neb., an assistant to the general purchasing agent in charge of purchases for the Union Pacific unit, and purchasing agents at Salt Lake City, Utah, Portland, Ore., and Los Angeles, Cal., in charge of the purchasing organizations of the Oregon Short Line, the Oregon-Washington Railroad & Navigation Company and the Los Angeles & Salt Lake units, respectively. Each purchasing department maintained an organization which placed orders direct for all materials purchased from eastern sources under contracts arranged by the general purchasing agent, and which also handled all local purchases in its territory. Sources and prices of standard items of material were established by the general purchasing agent, and contracts were also negotiated by that office for the four units of the system. The stores department was in charge of a general supervisor, with a general storekeeper on each of the four units of the system who reported direct to him, and with division storekeepers at each division terminal reporting to the general storekeepers.

In a series of steps, the offices of the general purchasing agent and the assistant to the general purchasing agent in Omaha were consolidated, while changes in the stores organization made it practicable for the Omaha office to become the purchasing organization for eastern and contract materials, thus relieving the western offices of these duties and confining their activities to local purchasing departments in their respective territories, except that the purchasing agent at Portland, Ore., continues to purchase all forest products for the system as before. In the stores department, the positions of general storekeeper on each of the three western units were abolished, as were the positions of division storekeepers. In their place, the office of general storekeeper in charge of the three western units was established at Pocatello, Idaho, while the office of general storekeeper in charge of the Union Pacific unit was retained.

Accounting by Stores Discontinued

In a subsequent move, Omaha was established as the general store for the system and the office of the general storekeeper was consolidated with that of the Omaha general store, thereby eliminating duplication of work which had existed in the two separate organizations. In conjunction with these changes, division stores discontinued accounting for material received and disbursed on their respective divisions, a central bureau being established at Pocatello to handle all accounting for the western lines, and a similar bureau at Omaha to handle all accounting for the U. P. unit, each of these newly-established units now operating under the direct supervision of the accounting department. These changes in the organization of the two departments, by eliminating duplication of effort and by permitting the simplification of methods in the respective departments, made the consolidating of the purchases and stores organization entirely feasible and practicable.

Under this plan, which became effective on February 1, 1933, the department now consists of the general purchasing agent, with an assistant to general purchasing agent and an assistant general storekeeper in charge of the U. P. stores organization, and a purchasing agent with a minimum office force on each of the three western units of the system, while the western lines' stores organization is immediately supervised by an assistant general storekeeper reporting direct to the general purchasing agent.

In the general office in Omaha, all requisitions of the using departments for material are now handled to conclusion, from the securing of quotations and the placing of orders to the distribution of the material to points of consumption. The consolidation of these activities affords opportunity to render more prompt and efficient service by having the complete transaction in one office and in one file, thus reducing interdepartmental corres-

pondence and eliminating delays caused by the divided responsibility between two departments, where one department handled the transaction to a certain point and the other department handled other details of the transaction.

Previously each stockman checked each class of material at established periods during the month and entered in his stock book the quantities on hand, calculated the past month's consumption by deducting this quantity from the amount on hand the previous month, plus receipts. The quantity of each item to be ordered was written in the space provided, and when the record of the entire section was completed, the stock book was forwarded to the storekeeper's office for check and approval. The stock book was then turned over to a requisition clerk and typist for the preparation of purchase requisitions. These requisitions were then approved by the storekeeper and forwarded to the general storekeeper at Omaha where they were checked against the master stock book. The necessary forms were then prepared to obtain the material from surplus reported at other stores and the purchase requisitions reduced correspondingly.

The purchase requisitions were then forwarded to the purchasing department, where sources of supply were inserted by the proper clerk and the inquiries for prices were typed where necessary. The requisitions were then approved by the general purchasing agent and returned to the order clerk for the preparation of the orders. When checked against the requisitions, the orders were then signed by the general purchasing agent.

Emergency requisitions were prepared by the stockmen for material needed at periods other than regular monthly intervals of stock-taking and similar forms were also prepared for material not listed in the stock books, while requisitions issued by the using departments were marked by the stockmen to indicate materials to be purchased. These "floor sheets" and department requisitions then followed the same routine as the stock books. This routine was followed at each division store, with the general storekeeper's office on each line handling the detail as to the utilization of surplus stocks.

Present Purchasing Methods

At the present time, orders are typed direct from stock-book coupons and "floor sheets" at the central offices, a practice which has completely eliminated the purchase requisitions and all the work incident to their preparation and handling. Stock is now taken each month as previously, but the carbon impression of the coupon is inserted in the master stock books in the general purchasing agent's office after each coupon has been approved by the storekeeper.

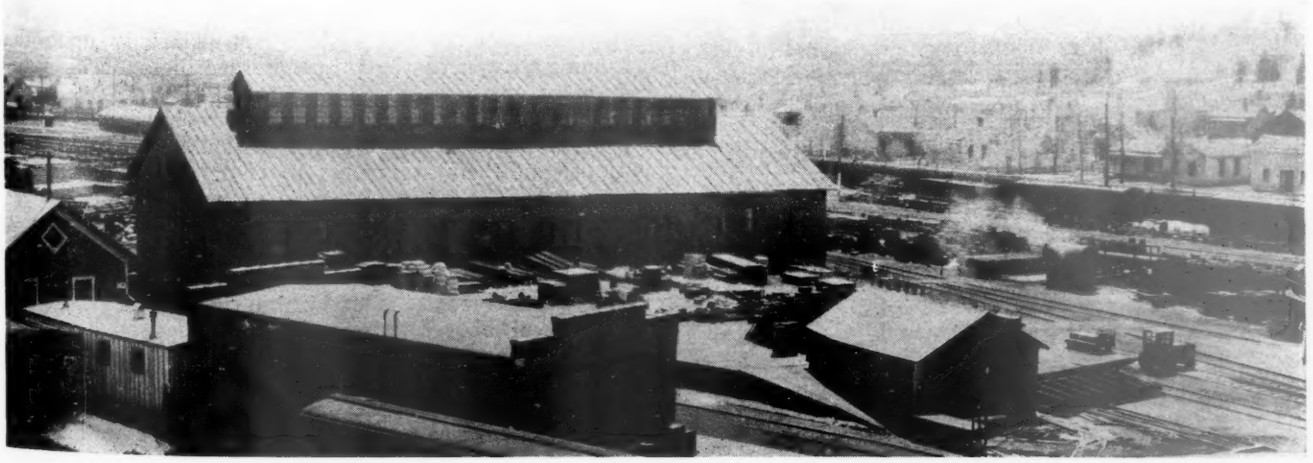
The master stock book is then examined by the purchase order clerk to discover available surplus in stock and when an item can be obtained in this manner, the entries of the store which reported the surplus are marked on the coupon for the information of the order typist. The stock book is then passed to the bid-and-requisition clerk who inserts the source of supply and other information necessary for the order, and it is then referred to the typist for preparation of the purchase order and the orders on other stores, the latter being called "back orders."

Similarly, orders prepared by the stockmen for emergency or special material, when approved by the storekeeper, are forwarded to the general purchasing agent's office, where each order takes the same routine as the coupon and stock book, as previously outlined. Such orders are then checked against the stock book or other memoranda, as the case may be, and are ready for the signature of the general purchasing agent or his assistant.

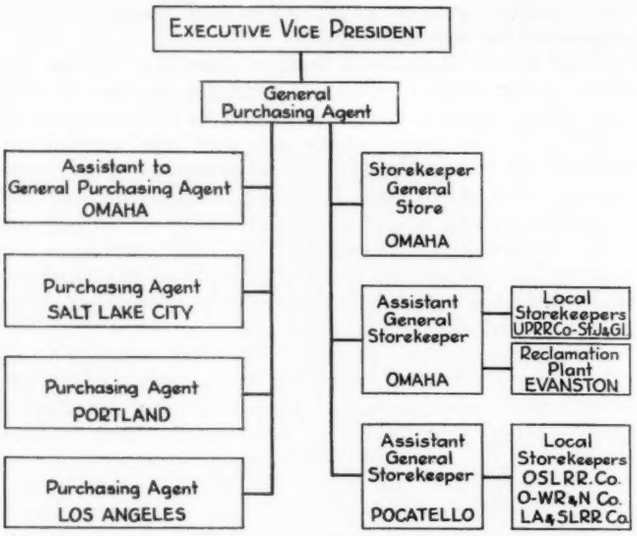
Every consistent effort is made to consolidate surplus material at the Omaha store. The store at Pocatello, by reason of its geographical location in serving the western units, and the store at Cheyenne, Wyo., by reason of the heavy consumption of material at that terminal, continue as important store points. The reclamation plant at Evanston, Wyo., which is under the direct supervision of a superintendent who reports to the assistant general storekeeper and handles the reclamation of all recoverable materials for the system lines, is also an important store point. The monthly inventory reports or coupons from these stores are likewise forwarded to the general purchasing agent's office to be pasted in the master stock books, for use in disclosing surplus material available for filling orders.

With the general store and the general purchasing agent's office both located at Omaha, considerable detail has been eliminated and the close co-operation of these two units of the organization facilitated by the continuous use of telephone and messenger service, producing a unified organization. In the simplified organization, the position of general stationer, with a stationer for each line, has been abolished and stationery now is handled in the stores department as a separate section of material just as other materials are handled, while the details of the purchasing of stationery are assigned to an experienced buyer reporting direct to the general purchasing agent.

The detailed clerical work of handling local pur-



A Section of the System Reclamation Plant at Evanston, Wyo.


Executive Vice President
General Purchasing Agent
Assistant to General Purchasing Agent OMAHA
Purchasing Agent SALT LAKE CITY
Purchasing Agent PORTLAND
Purchasing Agent LOS ANGELES
Storekeeper General Store OMAHA
Assistant General Storekeeper OMAHA
Local Storekeepers UPRRCo-St.J&GI
Reclamation Plant EVANSTON
Assistant General Storekeeper POCATELLO
Local Storekeepers OSLRR.Co. O-WR&N Co. LA&SLRR Co.

The Present Purchasing and Stores Organization of the Union Pacific System

chases at Salt Lake City, Portland and Los Angeles, has also been carefully systematized. Orders for material to be obtained locally at these points, as developed from stock books or other information, are typed in the storekeepers' offices at Pocatello, Portland and Los Angeles, complete with the exception of the name of the firm and the date. One copy of each order is forwarded to Omaha by the storekeeper, to be checked against records of surplus stock, after which they are released by wire and the orders forwarded to the local purchasing agent, who inserts the source, date, price, f.o.b. point and any other necessary information. The same plan is followed at the reclamation plant at Evanston in preparing orders for items required in repairing equipment, such orders being mailed to the general purchasing agent's office for the insertion of the firm name, etc., as outlined above.

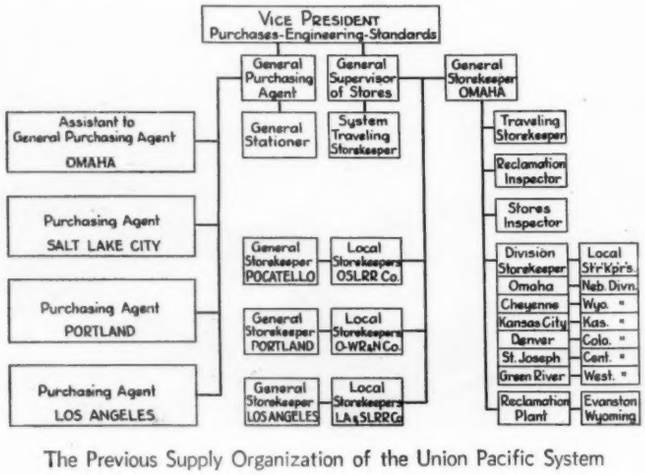
Stores Prepare Purchase Records

At the Omaha general store, requisitions are received from all store points and using departments on the system, the using departments making requisitions on the Omaha general store only for materials not carried by their local storekeepers. The originator of a requisition makes out all necessary documents to complete the transaction, i.e., the material requisition and copies to serve as the store-department invoice, the shipping notice and the shipping order. These forms are identical except that the headings of the individual copies are identified as above indicated and they are prepared at one typing, the one operation saving time and unnecessary duplication.

The time schedule for the receipts of requisitions for the different classes of materials at the Omaha general store from outside store points is enforced, except in the case of an emergency. This schedule prevents peaks and serves to spread the work evenly over the entire month, permitting all orders for the replenishment of stock of each class to be made at one time.

As soon as a requisition is filled, the columns of the four original documents are extended, and other pertinent data incident to the transaction are entered. The material requisition is filed in the storekeeper's office, the store department invoice is sent to the originator of the requisition, which may be the using department or local store, and the shipping order is sent to the freight agent for use in making out the waybill for cars leaving Omaha. The Omaha general store also receives copies of all orders prepared in the purchasing agent's office, and tracers for material and notices to rush delivery are issued by the general store directly to the firm concerned.

The changes which have been effected have not been abrupt, but are the culmination of continued study of the methods and activities of both departments and have been made as a gradual transition to the present organization.



The Previous Supply Organization of the Union Pacific System

President Urges Centralized Transportation Legislation

(*Continued from page 232*)

mended by Mr. Eastman for amending the bankruptcy act. This provides that a plan of reorganization "shall provide for the reduction of the fixed charges to an amount not in excess of 80 per cent of the average income, available for that purpose, of the debtor and any other corporations forming the reorganized system during the three consecutive years of the ten-year period preceding the year of the passage of this act, in which three consecutive years the income available for fixed charges was the lowest."

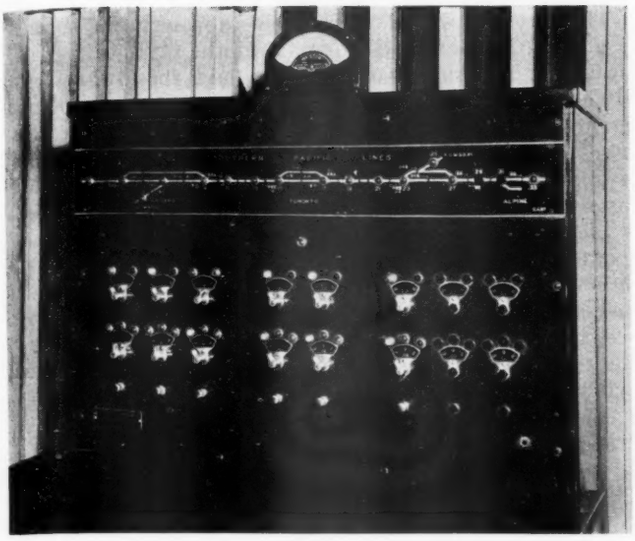
There is a proviso, however, that, where the circumstances require or make it appropriate, the commission may, in its discretion, approve of a higher percentage that in determining the income there may be made "all proper adjustments, to be considered and approved by the commission in its consideration of a plan as hereinafter provided, for special circumstances affecting the particular properties but not affecting railroads generally."

It is also proposed that the value of a property for reorganization purposes shall rest primarily upon the earning power of the property regardless of its valuation or costs.

Various organized groups that are interested in the program have already begun to assemble in Washington to present their arguments to Congress. The Mississippi Valley Association and a number of other waterway organizations filed with the President a protest against the proposals for regulation of water transportation, declaring that they represented an effort of the railroads to increase rates by water. A large delegation of railroad labor representatives is in session here prepared to campaign for the bills they have had introduced and to represent their interests in connection with Eastman's proposals. The executive committee of the Association of American Railroads also met here on Tuesday and Wednesday and devoted a large part of the time to consideration of the Eastman report.

Texas & New Orleans Installs Centralized Traffic Control

Train movements expedited on a twelve-mile section of single track used jointly with Santa Fe



The C.T.C. Machine Is Located in the Office at Alpine

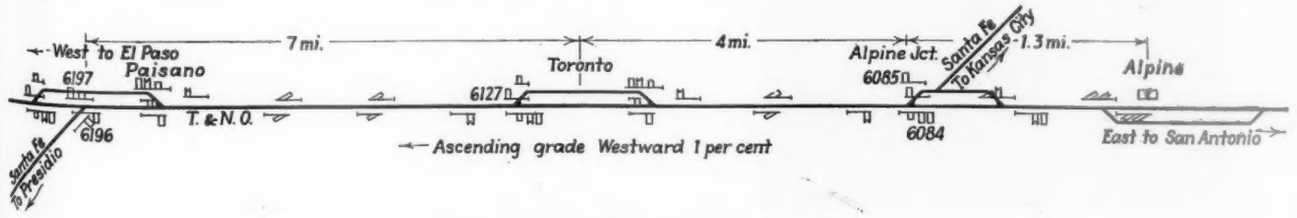
THE Texas & New Orleans unit of the Southern Pacific Lines has installed centralized traffic control on 12 miles of single-track between Alpine, Tex., and Paisano. In addition to handling the main line traffic of the Southern Pacific, consisting of two passenger trains and six to eight freight trains daily, this section of line is also used by the Atchison, Topeka & Santa Fe, which operates from two to four trains daily. This line of the Santa Fe is a portion of the old Kansas City, Mexico & Orient line from Wichita, Kan., to Alpine. When the Santa Fe purchased this road, arrangements were made to operate over the Texas & New Orleans from Alpine to Paisano, from which point a new line was built to Presidio, Tex., on the Rio Grande river, where connection is made with lines in Mexico.

The Texas & New Orleans line is on an ascending grade of approximately one per cent from Alpine westward to Paisano, the difference in elevation between the two points being 598 ft. Therefore, it is highly important that the number of unnecessary stops for westward trains be reduced to a minimum. At the time that arrangements were made for the Santa Fe to operate over this section, the traffic on the T. & N. O. was fairly heavy, and the Santa Fe anticipated handling considerable traffic to and from Mexico. Therefore, in order to simplify the joint operation, as well as to increase the track capacity and to facilitate train movements on the grade, it was decided to install the centralized traffic control.

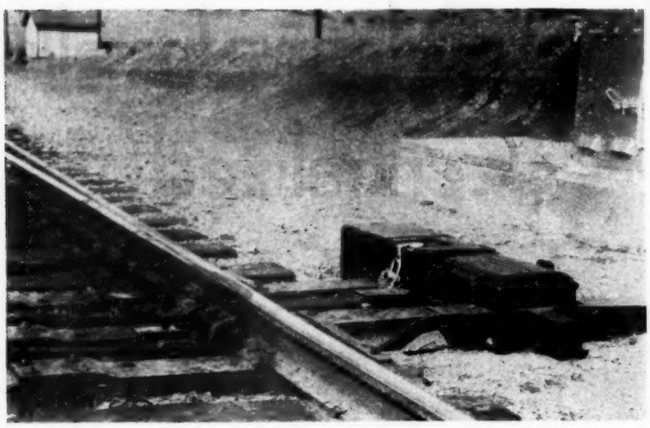
This installation includes power switch machines for the Santa Fe junctions at Alpine and Paisano as well as for the passing-track switches at Toronto and Paisano, a total of six power-operated switches. As this territory was previously equipped with lower-quadrant semaphore automatic block signaling, this was retained in service and signals of the same type were installed at the junctions and sidings to direct train movements.

These centralized-control signals have arms painted the same as interlocking home signals, and the indications displayed are the same as those of interlocking signals. On the T. & N. O., each main-line C. T. C. signal at the sidings has three arms, the top one being used to direct trains on the main line and the bottom arm to direct trains into the siding. Main-line station-leaving signals, such as signal 6127 at Toronto, are of the signal-arm semaphore type. Train movements from the sidings are governed by semaphore dwarf signals. Signal 6085 at Alpine junction and signal 6196 at Paisano, for directing train movements from the Santa Fe to the T. & N. O. are of the signal-arm standard semaphore type. Train movements from the T. & N. O. main line to the Santa Fe are directed by the second arm of signal 6084 at Alpine and signal 6197 at Paisano. All of these C. T. C. signals are controlled automatically by track circuits, as well as manually by the operator at Alpine. Each signal carries a number plate with the additional identification letters *SA*, meaning semi-automatic. The timetable rules stipulate that trains will operate in this territory in accordance with C. T. C. signal indications which supersede the superiority of trains, and shall run to a signal indicating "stop," but not pass it without securing permission by telephone from the operator at Alpine, and then be goverened by Rules 663 and 509. Mine-type telephones at each junction and at each end of both sidings are connected to a special circuit extending over the C. T. C territory and to the operator's office at Alpine. The maintainer is furnished with a portable phone which he can connect to the line at any point.

The centralized control machine in the office at Alpine



Track and Signal Plan of C.T.C. Territory



The Switch Layouts Are Well Equipped with Insulated Gage Plates and Braces

has six levers for six switches and six levers for signals. Blank lever spaces were provided to permit extending the installation from Alpine Junction to Alpine, including the east end of the passing siding. The levers are equipped with indication lamps according to the customary practice, and the illuminated diagram, with lamps normally dark, is mounted above the levers on the face of the machine cabinet. The two-wire coder system of line control is used.

Outside Construction

As a part of the reconstruction program in this territory, the a-c. floating system of power supply was installed to replace the portable storage battery arrangement formerly in service for the straight automatic-block signaling. Two No. 6 hard-drawn copper wires were strung on the existing signal department pole line to carry the 220-volt a-c. supply line. At each signal location the 220-volt circuit is brought into the instrument case to an enclosed double-pole switch with fuses. The circuit is then extended to the rectifiers. A set of 12 cells of Exide lead storage battery is used for the operation of each switch and coder unit, 12 cells being used for the former and 8 for the latter.

At the field stations, the relays, rectifiers and coder units are housed in sheet-metal cases with doors on each side, the battery being in concrete boxes. The wiring in the cases is No. 14 flexible with 19 strands, using Kerite insulation with dry black braid. The main wire runs from the relay cases to the signals and switch machines are in underground Kerite parkway cables, No. 6 wire being used for the switch feeds.

Eastward Signal at East End of Paisano

Signals and Switches

The Style-B signal mechanisms formerly in service as automatics were used for part of the C. T. C. signals. However, the signals on bridges and the dwarfs are Style-T2 mechanisms. At five different points in this territory where the view is restricted, switch indicators have been provided to warn men operating motor cars of approaching trains. All indicators, signal masts and cases are painted with two coats of aluminum paint.

The switch machines are the Style-M, equipped for operation on 20 volts d-c. At the time the switch machines were installed, the switch layouts were rebuilt. Insulated gage plates, 1 in. by 7 in., are used on three ties, including the one ahead of the points. On two of the ties, these plates extend and are attached to the switch machine.

Results Satisfactory

This C. T. C. installation has been quite satisfactory from an operating standpoint. All confusion and delay which might have been caused by joint operation of trains by the two roads has been eliminated. Train stops and delays have been reduced to a minimum; for example, the two transcontinental passenger trains of the T. & N. O. meet regularly each night at Toronto, the eastbound train, descending the grade, taking the siding, and in nine cases out of ten a non-stop meet is made.

This installation was designed and constructed by signal forces of the Texas & New Orleans, the signaling equipment, including the coder control system, being furnished by the Union Switch & Signal Company.

Eastman's Labor Protection Plans

(*Continued from page 239*)

ceivably be dismissed in the event the full work-week is applied to the consolidated force is approximately $1,000 ($992.85) and in the event the five-day week is applied, it is approximately $775 ($775.75). In the first case a total of 1,698 employees would be liable to displacement, whereas on the shorter-work-week basis this number would be 334. The maximum expenditure for dismissal compensation to which the project would be liable is $1,685,862. Should the five-day work-week be applied, this amount would be $259,102. Furthermore, on the assumption that the Railroad Retirement Act will apply, it was found that 384 employees 65 years of age, or soon to reach that age, would be subject to retirement just prior to, or shortly after, the effective date of co-ordination. These retirements would, of course, be made before the foregoing displacements.

It has been estimated that the yearly savings to be expected from the Greater Kansas City co-ordination project will be $2,081,699, of which $1,400,516, or 67 per cent, will be labor-saving. It is to be noted that the dismissal compensation plan, when applied to the maximum number of employees who may be displaced, is $1,685,862, or 81 per cent of the estimated gross yearly savings. In other words, the net effect of the proposed plan as applied to the project under consideration would be to distribute among the eligible employees up to the established number, i. e., 1,698, nearly $300,000 in excess of the first year's savings in labor expense. In this connection it is understood that under the recent agreement reached between the Baltimore & Ohio and its employees concerning compensation to be paid to those employees displaced because of a trackage co-ordination project between this railroad and the Pittsburgh & Lake Erie, the first year's net savings which result from this new arrangement are to be paid to those displaced employees who are eligible to receive such compensation.

Thus, on the whole, it appears that the dismissal compensation plan here proposed for the railroads is liberal when compared with plans variously utilized here and abroad; and it appears particularly liberal when compared with the scales of payments for displaced employees which, in the fairly recent past,

have been agreed to by certain railroads and their employees in this country. But no scale, however generous, will be able to carry to new jobs all the rail workers who may be displaced. A compromise must be made between the needs of the employee and the needs of the industry. In choosing the actual amount of compensation, therefore, due consideration has been given to other experience and the several needs of the displaced employees. The formula proposed takes into consideration all these factors and successfully integrates dismissal compensation with the annuities to be granted under the Railroad Retirement Act.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended January 26 totaled 555,768 cars, a decrease of 7,187 cars as compared with the week before and of 7,332 cars as compared with the corresponding week of last year, although it was an increase of 80,476 cars above the total for 1933. Loading of coal and coke showed increases as compared with the week before and as compared with last year, but all other commodity classifications showed reductions in both respects. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, January 26, 1935

Districts	1935	1934	1933
Eastern	133,712	128,727	108,220
Allegheny	109,594	107,476	88,402
Pocahontas	41,942	41,117	33,554
Southern	81,981	88,148	76,911
Northwestern	62,633	64,807	54,462
Central Western	81,187	84,633	70,664
Southwestern	44,719	48,192	43,079
Total Western Districts	188,539	197,632	168,205
Total All Roads	555,768	563,100	475,292
Commodities			
Grain and Grain Products	22,603	31,706	25,324
Live Stock	13,809	18,521	17,401
Coal	153,503	125,748	97,354
Coke	9,132	7,698	4,460
Forest Products	17,922	20,687	14,439
Ore	2,563	3,192	1,526
Merchandise L.C.L.	146,788	161,887	160,757
Miscellaneous	189,448	193,661	154,031
January 26	555,768	563,100	475,292
January 19	562,955	561,902	499,554
January 12	553,675	557,266	509,893
January 5	498,073	500,813	439,469
December 29		425,120	454,765
Cumulative Total, 4 Weeks	2,170,471	2,183,081	1,924,208

The freight car surplus for the first half of January averaged 376,575 cars, a decrease of 15,442 cars as compared with the number during the last half of December. The total included 222,274 box cars, 102,571 coal cars, 26,200 stock cars, and 9,618 refrigerator cars.

Car Loading in Canada

Car loadings in Canada for the week ended January 26 totaled 42,188, as against 40,171 in 1934 and 40,789 for the previous week, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
January 26, 1935	42,188	21,286
January 19, 1935	40,789	20,797
January 12, 1935	40,790	21,209
January 27, 1934	40,171	21,149
Cumulative Totals for Canada:		
January 26, 1935	157,684	81,834
January 27, 1934	156,697	81,418
January 28, 1933	123,795	67,480

New Books...

Freight Traffic Red Book. 1002 pages. 8 in. by 10½ in. Bound in cloth. Published by Traffic Publishing Company, Inc., 100 Sixth Avenue, New York City. Price $10., including supplements to October 1, 1935.

This is the fifteenth annual edition of this very useful book. Each year brings various improvements. Every possible subject connected with the transportation of freight by railroad, which can be put into a book of this kind, will be found here and dealt with in the fullest possible detail. Classification of freight, rate bases, the interstate commerce laws, other laws, and court decisions, history of important decisions of the Interstate Commerce Commission, and a great variety of printed forms are among the more notable subjects. Besides railroad freight traffic, the book includes voluminous information about express, parcel post and pipe line traffic, export freight and a large body of statistics. A half-dozen pages are given to the Federal Coordinator, and various other items indicate the up-to-date character of the book. If 59 subjects in the table of contents are not sufficient to arrest the attention of the reader, he may be recommended to look at the 46 pages which are filled with the several indexes. There is a large folded map of the United States, showing traffic territories.

Signal Section, A.R.A.; Proceedings 1933; Volume XXXI. 570 pages. 9½ in by 6 in. Published by R. H. C. Balliet, secretary, 30 Vesey Street, New York City. Price $8; to members of the Section $4.

This volume, though dated 1933, is concerned with the doings of the year 1934, made up of the advance notice, 379 pages of reports, and the minutes of the Chicago meeting of March 12 and 13, 147 pages.

Bound up with the report the committee of direction presents 85 pages of reports on research investigation, prepared at the request of the president of the American Railway Association. Some of these were presented and discussed at a meeting of the committee in Washington, last March. The reports are on the following subjects: 1. Track circuit shunting; prevention of improper operation of signals. 2. Economics of railway signaling. 3. Reflector signs for highway crossings. 4. Railway signal glass. 5. Lightning arresters for signal circuits. 6. Training of personnel. 7. Research and development facilities of the General Railway Signal Company. 8. Research and development facilities of the Union Switch & Signal Company. 9. Flashing light highway crossing signals. The reports dealing with the two signal manufacturing companies are illustrated with photographs taken in their shops and offices.

Who Pays? by Ernest Greenwood. 301 pages, 5 in. by 7 in. Illustrated. Bound in cloth. Published by Doubleday, Doran & Company, Inc., New York. Price $2.

Accidents have cost the American people 1,300,000 lives in the 15 years of peace since the World War, and it is the author's conviction that this toll could be greatly reduced if the significance of this loss were generally appreciated. To this end, he has devoted about half of his text to a popular analysis of the accident record, resorting frequently to examples and comparisons that drive home the message far better than statistical data. Separate chapters treat with accidents on the highway, in the home, in industry, in transportation other than highway, and also with fires. Railway casualties are discussed, with a brief note of commendation on the progress made in accident prevention and a discussion of highway-railway grade crossing elimination, but in the opinion of the author, $17,000,000,000 "is a vast sum to spend to save people from stupidity and carelessness."

Part II, The Answer, reviews efforts to reduce accidents and offers suggestions for an extension of the work. Separate chapters deal with the National Safety Council, the insurance companies as agencies for the promotion of safe practices, safety education in the schools, the proper function of the police and the courts, and a concluding appeal for organizations that will reach the entire population with safety education.

NEWS

N. I. T. League Opposes Co-ordinator's Proposals

Equality should come mainly from an easing of control over railroads, says Executive Secretary

Opposition to the regulatory policies proposed in the transportation legislative program submitted to Congress and the President on January 30 by Joseph B. Eastman has been taken by the National Industrial Traffic League. "The members of the League," according to Joseph H. Beek, executive secretary, "are generally opposed to binding other forms of transportation with the tight chains now wound about the railroads. It has been our idea that although it would be wise to have federal regulation of interstate motor vehicle transportation, both as regards rates and services, the proper way to bring that form of transport into regulative balance with the railroads would be to ease up a bit on the latter. Mr. Eastman's proposal would effect not the slightest relaxation on railroad regulation but, on the contrary would strangle progress in other forms of transportation as effectively as the railroads have been strangled.

"We shall strenuously oppose Mr. Eastman's proposal to eliminate that part of the law that would free the Commission from consideration of the compensatory factors of rates when it grants permission to depart from that section, not because we do not favor such a change, but because it does not go nearly far enough. For years sentiment among shippers opposing the long-and-short-haul provisions of that act has been growing, and more than a year ago we instructed our committee to work unfalteringly toward that end. We shall convene our executive committee as soon as possible and we may call a special meeting of the membership to discuss the proposals."

The Long Island in the Storm

The Long Island, which experienced considerable difficulty in maintaining schedules following the heavy snowfall of January 23, has issued a statement outlining its efforts to cope with the storm's aftermath—the drifting and redrifting of the snow onto its tracks as a result of the high winds frequently prevailing on Long Island. This statement, issued on January 30, gives a detailed schedule of assignments of Long Island snow-fighting equipment, after first setting forth the general situation as follows:

"Although a full week has elapsed since Long Island was visited by one of the heaviest snow falls since the blizzard of 1888, and in spite of the fact that sunshine has been in evidence almost daily since the snowstorm of last week, the Long Island Railroad continues to experience considerable difficulty in keeping some of its branches open for traffic, particularly in the eastern part of the Island, on the main line, Montauk and Port Jefferson branches, because of snow drifts up to six feet in depth resulting from high winds.

"In many places on the Island the snow is not packed. When struck by the frequently prevalent high winds this snow drifts rapidly and suddenly to the railroad tracks and effectively impedes traffic. Trains cannot be moved until these new snow drifts are removed. The same stretches of track have to be cleared of these wind-blown drifts time and again. Regardless of the amount of removal equipment available, this repeated clearing of the tracks requires time, which must obviously retard the railroad's schedules."

Western Railway Club Meeting

The next regular monthly meeting of the Western Railway Club, to be held Monday evening, February 18, at the Hotel Sherman, Chicago, will be addressed by U. K. Hall, general purchasing agent, Union Pacific System, on the subject "The Purchasing and Stores Departments—Their Relationship to Railroads and the Public."

Dry Goods Men Oppose Government Ownership

The traffic group of the National Retail Dry Goods Association has announced its intention of sending to the President and government officials a set of resolutions expressing opposition to any plan for government ownership of the railroads.

Senator Wheeler Advocates Government Ownership

Government ownership of the railroads was advocated by Senator Burton K. Wheeler, of Montana, chairman of the Senate committee on interstate commerce, in a radio address on February 3, in which he said he had been preparing a bill for the purpose. "I have learned," he said, "that government ownership does not necessarily improve matters, but after an intensive study of the pros and cons I am convinced to-day that government ownership of the railroads is the only way out of the perplexing difficulties facing private ownership and management of this most important of public utilities."

Probe of Rail Financing and Management Urged

Senator Wheeler introduces bill for sweeping investigation by Senate committee

A sweeping investigation by the Senate committee on interstate commerce into all sorts of matters pertaining to the financing and management of railroads is proposed in a resolution, S. Res. 71, introduced in the Senate on February 4 by Senator Burton K. Wheeler, of Montana, chairman of the committee. Instead of waiting for the Senate to adopt the resolution the committee has decided to begin the performance by holding hearings probably next week on the question as to whether the resolution shall be reported.

The committee, or a subcommittee would be directed to make and report to the Senate the results of "a thorough and complete investigation of the financing, refinancing, reorganizations and readjustments, consolidations, mergers, acquisitions, and dispositions, receiverships and bankruptcies, credit arrangements and activities, securities operations and activities, dividend or other financial policies, corporate management and control, voting trusts, trusts under indentures and similar instruments and other agency and depositary arrangements, management, service, equipment and supply contracts and arrangements, intercorporate relationships and transactions, and matters and practices related to any of the foregoing or related to the protection of Government funds, investors or railroad credit, in respect to interstate railroads, railroad holding companies, railroad affiliates, and railroad subsidiaries, any corporation or person which is or has been affiliated with any of the foregoing, banking, legal, engineering, accounting, and other professional corporations, persons or groups occupying a fiduciary or contractural position or relation with any of the foregoing, and any member of the family of any such person, and any officer, agent, or director of any such corporation or group."

Railway Tie Association

The Railway Tie Association has moved its headquarters from the Syndicate Trust building to the Railway Exchange building, St. Louis, Mo.

Superintendents' Association

The American Association of Railroad Superintendents will hold its forty-first annual convention at Chicago on June 18-20.

Class I Net Last Year Totaled $462,698,447

Return of 1.77 per cent on property investment compares with 1.8 per cent in 1933

Class I railroads in 1934 had a net railway operating income of $462,698,447, which was a return of 1.77 per cent on their property investment, according to reports filed with the Bureau of Railway Economics of the Association of American Railroads. The net railway operating income in 1933 was $474,212,304 or 1.80 per cent.

Freight revenue amounted to $2,633,386,912 in 1934, compared with $2,492,893,539 in 1933, an increase of 5.6 per cent. Passenger revenue in 1934 amounted to $346,220,277, an increase of $16,878,386 or 5.1 per cent compared with 1933. Total operating revenues amounted to $3,271,446,473 compared with $3,095,620,731 in 1933, an increase of 5.7 per cent. Operating expenses in 1934 totaled $2,441,772,339 compared with $2,249,535,599 in 1933, an increase of 8.5 per cent. The operating ratio, or ratio of expenses to revenues, increased from 72.67 per cent in 1933 to 74.64 per cent in 1934.

Class I railroads in 1934 paid $239,506,857 in taxes, a reduction of $10,138,486 or 4.1 per cent compared with 1933.

Thirty Class I railroads operated at a loss in 1934, of which 8 were in the Eastern district, 8 in the Southern, and 14 in the Western.

For December, net railway operating income amounted to $38,729,833, 2.43 per cent on the property investment. In December, 1933, the net was $37,726,339 or 2.34 per cent.

Total operating revenues for December amounted to $257,505,761, compared with $245,346,958 in December, 1933, an increase of 5 per cent. Operating expenses totaled $195,351,270, compared with $187,098,404 in the same month the year before, an increase of 4.4 per cent.

Net railway operating income in the Eastern district in 1934 amounted to $273,315,087, a return of 2.26 per cent. In 1933 their net was $281,770,845 or 2.32 per cent. Total operating revenues in the Eastern district in 1934 aggregated $1,662,244,316, an increase of 4.9 per cent above 1933, while operating expenses totaled $1,203,860,965 an increase of 7.9 per cent above 1933. Class I railroads in the Eastern district for December had a net of $23,924,061, compared with $20,114,241 in December, 1933.

Class I railroads in the Southern district in 1934 earned a net of $54,523,781, 1.69 per cent on the investment. In 1933, the net amounted to $59,677,489, a return of 1.82 per cent. Total operating revenues in the Southern district amounted to $408,242,451, an increase of 5.1 per cent over 1933, while operating expenses totaled $315,267,588, an increase of 8.3 per cent. Net railway operating income in the Southern district in December amounted to $6,570,303, while in the same month of 1933 it was $6,615,028.

Class I railroads in the Western district in 1934 earned a net railway operating income of $134,859,579, a return of 1.25 per cent. In 1933, they earned a net of $132,763,970, a return of 1.22 per cent. Total operating revenues in the Western district in 1934 aggregated $1,200,959,706, an increase of 6.9 per cent above the preceding year, while operating expenses totaled $922,643,786 an increase of 9.4 per cent.

For December, net railway operating income amounted to $8,235,469. Net railway operating income of the same roads in December, 1933, totaled $10,997,070.

CLASS I RAILROADS—UNITED STATES

	1934	1933	Per cent Increase
Month of December			
Total operating revenues	$257,505,761	$245,346,958	5.0
Total operating expenses	195,351,270	187,098,404	4.4
Taxes	13,708,237	11,273,450	21.6
Net railway operating income	38,729,833	37,726,339	2.7
Operating ratio—per cent	75.86	76.26	..
Rate of return on property investment—per cent	2.43	2.34	..
Twelve Months Ended December 31			
Total operating revenues	$3,271,446,473	$3,095,620,731	5.7
Total operating expenses	2,441,772,339	2,249,535,599	8.5
Taxes	239,506,857	249,645,343	4.1 Dec.
Net railway operating income	462,698,447	474,212,304	2.4 Dec.
Operating ratio—per cent	74.64	72.67	..
Rate of return on property investment—per cent	1.77	1.80	..

"George M. Pullman" Now On Pennsylvania

The George M. Pullman, the all-aluminum Pullman Car displayed by the Pullman Company at the Century of Progress Exposition, was placed in service on the Florida Arrow of the Pennsylvania on February 6 to operate between Chicago and Jacksonville.

North Western's "400" Averages 320 Persons Daily

During the 30 days from January 2 to January 31, the "400" of the Chicago & North Western, operating between Chicago and the Twin Cities, carried 9,591 passengers or 320 persons daily. At the same time the earnings of this train have been more than double the direct cost of operation. The patronage of the train, more than two-thirds of which has consisted of through passengers between Chicago and the Twin Cities, has not been taken from other North Western trains operating between these points. Based on figures in and out of the Chicago passenger station for the first 26 days, the average number of travellers on trains between these points, including The Viking, The Victory and The North Western Limited, has been five per cent more than for the same period in January, 1934. Since its inauguration on January 2, the "400" has carried an extra parlor car on every trip.

Roosevelt Work-Relief Bill Still Under Consideration

Grade crossing elimination program still talked of as important feature of plan

A program of grade crossing elimination is still being talked of as an important part of the President's work-relief plan, for which he has asked Congress to appropriate a lump sum of $4,000,000,000, but no information has yet been made public as to the extent of the program or as to who will administer it or select the projects. Meanwhile both the Bureau of Public Roads and the Public Works Administration are assembling lists of projects. The bill has been passed by the House but in the Senate it is still before the committee on appropriations. At a hearing before the committee Admiral C. J. Peoples, director of the Procurement Division of the Treasury, who appeared as spokesman for the Administration, testified that the projects to be selected would be drawn from a "reservoir" of desirable projects proposed by various agencies, amounting in all to $32,000,000,000, but that segregation of the items was impossible because the plans must be kept flexible. One of the items in the $32,000,000,000 total was $2,000,000,000 or more for grade crossings, and in previous testimony before the House committee he had said that $15,000,000,000 could be spent for the purpose.

Asked by a member of Congress as to how the cost of grade crossing eliminations would be met he replied: "There is nothing proposed as to that policy. It is my personal belief that some kind of a plan will have to be worked out with the railroads by which they will have to bear part of this expense. I would say they would be loaned the money at a low rate of interest." Admiral Peoples explained that his department had been asked to analyze the various classes of projects but gave no indication as to who would have charge of the program. "This type of project would not be directly self-liquidating," he said, "However, the elimination of life and property loss now resulting from grade crossing accidents and the gain in efficiency of railway and automotive transportation will result in additions to the public wealth far in excess of the cost."

He also mentioned the building of a number of express highways as among the possibilities, and when asked if they would not add to the competition facing the railroads he said: "Not any more than they now have."

Representative Cartwright, of Oklahoma, has introduced in the House a bill to authorize an appropriation of $300,000,000 for grade crossing elimination, to be appropriated by the Secretary of Agriculture.

Northwest Shippers' Board

The Northwest Shippers Advisory Board, at its twelfth annual meeting on January 29 in St. Paul, Minn., went on record as urging federal regulation of in-

terstate trucks and elimination of the fourth section of the interstate commerce act and as opposing the proposed six-hour day, full train crew and train length limitation legislation. The principal speaker was C. S. Duncan, economist of the Association of American Railroads, who discussed economic problems in transportation planning, the address being given at a luncheon arranged for board members and guests by the Association of Commerce and the Transportation club of St. Paul. All officers of the board were reelected.

Great Lakes Car Ferries

The Senate on January 30 passed a bill, S.619, to except the Great Lakes car ferries owned by the Grand Trunk and the Duluth, South Shore & Atlantic from the provision in the merchant marine act of 1920 requiring that corporations engaged in coastwise shipping shall be at least 75 per cent owned in the United States. The exception applies when the ferry operation is part of a route operated with the approval of the Interstate Commerce Commission and the vessels are documented under laws of the United States. Senator Vandenberg, of Michigan, who urged the passage of the bill, said it had been discovered, unexpectedly, that these operations were against the law and that the Department of Commerce desired the amendment.

Snow Trains Still Popular

"Snow trains" operated out of New York on February 3 carried hundreds of sportsmen and sportswomen to winter sporting grounds along the various railroads. The New York, New Haven & Hartford train which was operated to Norwalk, Conn., was sold out on Tuesday, January 29, as was reported in last week's issue. The Delaware, Lackawanna & Western train carried approximately 450 to Pocono Summit, Pa., while the Erie train carried about 400 to Norsemen Hill, Salisbury Mills, N. Y. Approximately 500 patronized the West Shore's train to Bear Mountain while several hundred more went there on regular West Shore trains. Other "snow trains" will be operated by these roads on forthcoming Sundays as long as snow conditions at destination points permit.

New Equipment Installed

Class I railroads installed 24,103 new freight cars in 1934, according to reports received by the Association of American Railroads. In 1933 there were 1,879 new freight cars placed in service and in 1932 there were 2,968. Fifty-nine new steam locomotives and 31 new electric locomotives were placed in service in 1934. The railroads in 1933 installed one new steam locomotive and 37 in 1932.

New freight cars on order on January 1 totaled 628 compared with 224 on the same day last year and 2,431 on the same day two years ago. The railroads on January 1 this year also had 7 new steam locomotives and 90 new electric locomotives on order. New steam locomotives on order on January 1, 1934, totaled 1 and on the same day in 1933, there were 3. No figures are available to show either the number of new electric locomotives installed or on order in previous years. Freight cars and locomotives leased or otherwise acquired are not included in the above figures.

N.Y.C. Passenger Trains Discontinued

The Public Service Commission of New York has authorized the discontinuance of passenger train service on 182 miles of New York Central lines: Rochester, N. Y., via Charlotte westward to Suspension Bridge, 91 miles (28 stations); and Rochester via Charlotte eastward to Oswego, 79 miles (24 stations); and, by another order the 12 miles of the branch from Watertown, N. Y., westward to Sackets Harbor. Regular passenger train service on these lines had been mostly suspended since 1933, and there has been one mixed train each way daily, except Sunday. On some days, some of these trains would make a complete trip without either passengers or freight. On the two lines first named, the trains will be continued in service but will have no passenger cars. On the Sackets Harbor line, a freight will be run each way three days in the week.

New P.R.R. Streamlined Electric Locomotive Exhibited

The Pennsylvania's new streamlined locomotive which hauled the first electric train between Washington, D. C., and Philadelphia, Pa., on January 28, setting new speed records for that journey, was on exhibition this week at various points along the P.R.R.'s New York-Washington electrified line. The locomotive is the first of 58 of the GG-1 type which are being built for the through electric passenger service between New York and Washington.

At Pennsylvania Station, New York, where the locomotive was on exhibition February 4, a total of about 6,500 persons visited it; it next proceeded to Newark, N. J., where it attracted 3,000. During the remainder of the week it was exhibited at Trenton, N. J., Philadelphia, Wilmington, Del., and Washington.

Net Deficit For Eleven Months $43,056,920

Class I railways have reported to the Interstate Commerce Commission a net deficit of $43,056,920 for the first eleven months of 1934, after interest and other fixed charges, as compared with a deficit of $28,186,186 for the corresponding period of 1933. For the month of November the net deficit was $12,124,848, as compared with $5,116,463 in November, 1933. The commission's compilation of selected income and balance-sheet items follows:

SELECTED INCOME AND BALANCE-SHEET ITEMS OF CLASS I STEAM RAILWAYS

Compiled from 143 reports (Form IBS) representing 149 steam railways

TOTALS FOR THE UNITED STATES (ALL REGIONS)

For the month of November 1934	For the month of November 1933	*Income Items*	For the eleven months of 1934	For the eleven months of 1933
$31,882,801	$37,662,127	1. Net railway operating income	$423,117,536	$436,485,963
12,225,455	13,616,973	2. Other income	152,881,528	156,341,551
44,108,256	51,279,100	3. Total income	575,999,064	592,827,514
11,259,868	11,027,701	4. Rent for leased roads	122,686,064	121,711,470
43,477,835	43,642,196	5. Interest deductions	477,475,747	485,902,725
1,495,401	1,725,666	6. Other deductions	18,894,173	13,399,505
56,233,104	56,395,563	7. Total deductions	619,055,984	621,013,700
d12,124,848	*d 5,116,463*	8. Net income	*d 43,056,920*	*d 28,186,186*
		9. Dividend declarations (from income and surplus):		
13,313,420	13,098,508	9-01. On common stock	76,781,113	65,755,883
874,617	930,599	9-02. On preferred stock	14,527,928	12,461,031

BALANCE-SHEET ITEMS

Selected Asset Items	Balance at end of November 1934	Balance at end of November 1933
10. Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	$801,458,295	$753,047,157
11. Cash	348,401,163	340,969,389
12. Demand loans and deposits	36,146,518	40,195,729
13. Time drafts and deposits	34,963,578	57,313,344
14. Special deposits	54,361,403	28,849,113
15. Loans and bills receivable	6,698,805	10,064,384
16. Traffic and car-service balances receivable	49,271,497	53,058,170
17. Net balance receivable from agents and conductors	43,756,679	43,407,467
18. Miscellaneous accounts receivable	156,507,021	136,535,202
19. Materials and supplies	300,793,376	295,733,197
20. Interest and dividends receivable	51,285,364	49,373,672
21. Rents receivable	3,262,073	2,565,094
22. Other current assets	3,873,045	4,455,713
23. Total current assets (items 11 to 22)	$1,089,320,522	$1,062,520,474
Selected Liability Items		
24. Funded debt maturing within 6 months*	$178,427,295	$297,222,440
25. Loans and bills payable†	307,559,735	340,005,656
26. Traffic and car-service balances payable	63,262,085	66,593,413
27. Audited accounts and wages payable	220,750,051	217,182,494
28. Miscellaneous accounts payable	71,871,572	56,741,411
29. Interest matured unpaid	299,326,602	216,459,534
30. Dividends matured unpaid	4,682,240	4,779,954
31. Funded debt matured unpaid	272,079,848	96,000,760
32. Unmatured dividends declared	13,073,863	13,135,758
33. Unmatured interest accrued	123,400,482	124,396,241
34. Unmatured rents accrued	41,734,563	40,370,270
35. Other current liabilities	16,356,938	14,905,162
36. Total current liabilities (items 25 to 35)	$1,434,097,979	$1,190,570,653
37. Tax liability (Account 771):		
37-01. U. S. Government taxes	34,842,892	36,767,910
37-02. Other than U. S. Government taxes	140,891,026	157,689,948

* Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within 6 months after close of month of report.
† Includes obligations which mature less than 2 years after date of issue.
d Deficit.

No Compulsory Co-ordination Planned in Canada

That the present Board of Railway Commissioners for Canada is overmanned and also that until applications had been made to the Board by the railway companies for the creation of an Arbitral Tribunal to consider projects for joint economies on the part of the railways no appointment to fill the present vacant chairmanship on the Board would be made was a brief statement made in the House of Commons by Hon. Robert J. Manion, Minister of Railways and Canals, to questions asked by Hon. W. D. Euler, former Liberal Cabinet Minister. This is taken to mean that little more may be expected in the way of joint economies by the two roads, and it is also believed that when a new chairman is named he will be Hon. Hugh Guthrie, present Minister of Justice.

New York Railroad Club

The New York Railroad Club will stage a "Car Builders' Night" at its February meeting to be held at the auditorium of the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on February 15. Discussion of the meeting's general subject—Modern Trends in Freight and Passenger Cars—will be opened by C. B. Peck, managing editor of the Railway Mechanical Engineer, whose brief outline of the situation will be followed by the reading of papers by V. R. Willoughby, chief mechanical engineer, American Car & Foundry Company; M. C. Blest, chief engineer, Pressed Steel Car Company; and I. A. Belding, manager, special car department, General American Transportation Corporation.

These talks, the announcement states, "have been prepared with a view of purposely omitting a great deal of tedious engineering detail and emphasizing some of the salient points and new features in cars that have been conceived to improve and lessen the cost of transportation."

Zephyr Continues to Show Results

Passenger traffic handled by the Zephyr of the Chicago, Burlington and Quincy between Lincoln, Nebr., Omaha and Kansas City, Mo., since November 11, has continued at a high level throughout this period. During December and January (omitting November because of the many curiosity riders during the first weeks) the total mileage made by travellers using the Zephyr was 193 per cent more than during the same two months a year ago on the steam trains which the Zephyr replaced. The remaining steam trains between Omaha and Kansas City enjoyed about the same percentage of increase as the system as a whole which was 26 per cent over the corresponding two months a year ago. During December when there was considerable holiday traffic, travel on the Zephyr more than trebled that of the previous December, while during January the increase was 153 per cent.

In answer to the question "Are you riding this train because it is the Zephyr or would you be making a trip at this particular time if this were an ordinary steam train instead of the Zephyr?" passengers replied as follows, during December and January 63 per cent would have used an ordinary steam train at that time; 16 per cent would have used some other steam train except for the Zephyr; 16 per cent would have used an automobile, a bus or an airplane; and 5 per cent would not have been making the trip at all and were merely riding the Zephyr out of curiosity.

Canadian Revenues in January

Combined gross revenues of the Canadian Pacific and Canadian National totaled $20,376,286 in January, a decline of one per cent from January of last year, this being the first decline for any month since last June. In addition, the month's combined gross was the smallest for any month since February of last year.

In the case of both lines, the snow blockage in the Rocky Mountains held up freight and passenger movement with a consequent reduction in revenues, but in the case of the Canadian National a heavy movement of automobiles from Michigan over its lines contributed to offset the decline in western domestic freight movements.

Canadian Pacific revenues for the month totaled $8,266,000 as compared with $8,970,000 in January of last year, a reduction of eight per cent. The Canadian National reported gross revenues for the month of $12,110,266, an increase of 4.7 per cent over the $11,562,577 reported in January a year ago.

Employment Created by Rail Loans

Production of steel rails purchased in 1934 by railroad companies with PWA loans provided 21,000,000 man-hours of indirect and industrial employment in all branches of the steel industry, in addition to 5,500,000 hours of direct employment given to railroad track forces called back to work to lay the rails, according to a statement issued by the PWA based on a report to Public Works Administrator Harold L. Ickes by the Bureau of Labor Statistics of the Department of Labor, which is making studies to determine the amount of indirect and industrial employment created by production of materials for use on PWA projects.

Various estimates have been offered to PWA by different agencies interested in the ratio of direct construction site labor to indirect labor. In no case has PWA accepted such a high ratio of indirect to direct employment as 4 to 1 in any PWA compilations.

PWA loans to 19 roads for rail purchases resulted in the manufacture of 424,744 tons in 1934, or 16,500 tons more than the total rail production of the steel industry in 1933. A total of 1,007,746 tons of rail were rolled in 1934, according to trade records. Purchases financed by PWA account for 42 per cent of the total rail production for 1934, according to the statement indicating the extent to which the public works program has aided in reviving employment in this branch of the heavy industries.

Loaning Powers of R.F.C. Extended

The conference report on the bill to extend the loaning powers of the Reconstruction Finance Corporation, including broadened powers to make loans to railroads for purchase of equipment, reorganization, consolidation, maintenance, or construction, subject to the approval of the Interstate Commerce Commission, was adopted by both House and Senate on January 31 and was signed by the President late in the evening. Without this bill the lending powers of the corporation would have expired on January 31. The bill as passed retains the provision of the Senate bill imposing a limitation on the amount of railroad loans but clarifies it so that the limitation of $350,000,000 will apply solely to loans, commitments, purchases, and guaranties made after the date of the enactment of the new act, so that it is clear that it will not affect existing loans and commitments or renewals thereof. The proviso is worded to apply to the total "at any one time," so that it could be made a revolving fund by the sale of equipment trust certificates as occasion offered, which would make additional loans possible.

During December the corporation authorized railroad loans as follows: Chicago, Milwaukee, St. Paul & Pacific, $4,000,000; Illinois Central, $4,000,000; Erie, $3,179,000; and Pittsburgh & West Virginia, $500,000.

Chairman Jones of the R. F. C. said at his press conference on Monday that the corporation had received many offers from banks to purchase some of its railroad loans but that it had no present intention of disposing of them, because, except for those to roads now in receivership or in the hands of trustees, it has collateral worth 175 per cent of the loans at present market values.

Annual Meeting Advertising Agents

A plan designed to bring about a more effective and timely consideration of advertising problems was adopted at the annual meeting of the American Association of Railway Advertising Agents, held in Florida on Jan. 19-23. Under this plan two committees composed of members in the eastern and western parts of the United States will each hold four meetings a year to discuss current matters. Each committee will have a chairman and a secretary and the proceedings of each meeting will be sent to all members. In this manner members will not be required to travel long distances and the meetings of the committees can be arranged to coincide with territorial meetings held during the year. Other subjects considered at the Florida meeting included media for advertising and joint advertising.

The meeting this year consisted of business sessions and a trip to important points in Florida. The members assembled at Jacksonville and held business sessions at Orlando, Miami and St. Augustine.

Officers elected for the ensuing year are: President, P. V. D. Lockwood, New York Central; Vice Presidents, O. J. McGillis, Great Northern, Holcombe Parkes, Norfolk & Western, H. B. Northcott, Union Pacific, Geo. A. Semmlow, Chicago, Milwaukee, St. Paul & Pacific, and O. F. Copper, Atlantic Coast Line; Secretary, E. A. Abbott, Poole Bros., Inc., and Treasurer, E. A. Mitchell, Atchison, Topeka & Santa Fe.

Construction

BOSTON & ALBANY.—This road has been directed by the New York Public Service Commission to award a contract for the elimination of the Third street and Tanners Lane crossings in Hudson, N. Y., on or before March 15, 1935.

CENTRAL OF NEW JERSEY.—Bids will soon be invited by this road for work estimated to cost a total of $360,000, on two underpasses of its line in New Jersey. One of the projects, estimated to cost about $220,000, contemplates the widening of an underpass carrying New Jersey State highway route No. 21 under C. N. J. tracks at Ward street, Newark, N. J.; the other will involve the construction, at an estimated cost of about $140,000, of an underpass for New Jersey State highway route No. 31 at Cornell boulevard, Raritan, N. J.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—This company plans to commence work early in the spring on the construction of a highway subway where Waukegan road crosses its double-track line at Glenview, Ill. The structure, which will cost about $250,000, will consist of plate girder spans 136 ft. long on concrete abutments on which the tracks will be carried over the highway.

NEW YORK CENTRAL.—A contract has been given to the P. T. Cox Contracting Company, New York, for work on the West Side improvements, New York City, between Forty-second and Fifty-third streets, and a contract has been given to the Poirier & McLane Corporation, New York, for work between Seventy-second and Seventy-sixth streets.

NEW YORK CENTRAL.—The elimination of the Congress street crossing of this road in Schenectady, N. Y., has been ordered by the New York Public Service Commission. This is to be accomplished by carrying the highway over the railroad on a new structure to be constructed at a point about 980 ft. northwest of the present crossing; it will be a 100-ft. plate girder bridge which will have a clearance of 21 ft. over the tracks.

NEW YORK, NEW HAVEN & HARTFORD.—This road is carrying out a rail renewal program in Connecticut with company forces, to cost about $77,000.

PENNSYLVANIA.—The New York Public Service Commission has approved a revised general plan and special specifications, also an estimate of cost of $216,500, for the elimination of the Sand Hill crossing of the Pennsylvania on the Scottsville-Rochester county highway about a mile northeast of Genesee Junction in the town of Chili, Monroe county, N. Y.

SOUTHERN PACIFIC.—A contract has been awarded to Earl W. Heple, San Jose, Cal., for the grading in connection with a change of line between West San Jose and Lick and Valbrick. The contract involves the handling of about 90,000 cu. yd. of material at a cost of approximately $35,000.

Equipment and Supplies

FREIGHT CARS

THE PENNSYLVANIA SALT MANUFACTURING COMPANY has ordered two tank cars of 4,000 gal. capacity and two tank cars of 6,000 gal. capacity from the General American Transportation Corporation.

PASSENGER CARS

THE NEW YORK RAPID TRANSIT COMPANY will receive bids March 1 for 25 five-section articulated car units for service on the subway and elevated lines.

IRON AND STEEL

THE ST. LOUIS-SAN FRANCISCO has ordered 15,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 800 tons of structural steel for a bridge at Joliet, Ill., from the American Bridge Company.

THE SOUTHERN PACIFIC has placed orders for 26,174 tons of rail of 112-lb. and 131-lb. sections. The order was divided as follows: Columbia Steel Company, 12,559 tons; Colorado Fuel & Iron Company, 7,615 tons; Pacific Coast Steel Corporation, 6,000 tons.

MISCELLANEOUS

THE MISSOURI & NORTH ARKANSAS has sold 200 freight cars and 15 locomotives to Iron & Steel Products, Inc., Chicago for dismantling.

THE PENNSYLVANIA has placed an order with The Timken Roller Bearing Company, Canton, Ohio, for bearings and boxes for all driving and other axles of 37 new streamlined, high-speed electric passenger locomotives. This is in addition to the Pennsylvania's order placed with the Timken Company three months ago for roller bearings for all axles of 28 new electric locomotives and two experimental electric locomotives, making a total of 165 Pennsylvania electric locomotives with Timken bearings on all axles, including driving axles.

Air Conditioning

The following roads have placed orders with the Pullman-Standard Car Manufacturing Co., for air conditioning equipment which will be installed in railroad shops: Delaware Lackawanna & Western, for 10 coaches; Texas & Pacific, for 1 dining car; Northern Pacific, for 6 dining and 4 observation cars and 12 coaches and smoking cars, and the Chicago Burlington & Quincy, for 2 coaches.

Supply Trade

American Brake Shoe & Foundry Company Annual Report

The American Brake Shoe and Foundry Company, for the year ended December 31, 1934, reported consolidated net earnings of $1,169,341 after all deductions, including $835,957 for depreciation. This 1934 net, which was equivalent after preferred dividends, to 83 cents per share on the outstanding common stock, compares with a 1933 figure of $986,692 or 53 cents per share.

The company's already strong current position was further strengthened by the increase of $430,599 in net current assets. As of the close of last year the current assets totaled $9,660,092, including $3,347,557 in cash, as against total current liabilities of $690,105.

The consolidated income and surplus account as of the close of the past two years follows:

The American Brake Shoe and Foundry Company

Consolidated Income and Surplus Account For Years Ended December 31, 1934 and December 31, 1933

	1934	1933
Earnings before depreciation and income taxes	$ 2,081,770	$ 1,824,674
Dividends received from affiliated companies not consolidated	95,362	77,825
Total	$ 2,177,132	$ 1,902,499
Less:		
Provision for depreciation of plants and equipment	$ 835,957	$ 852,912
Provision for U. S. and foreign income taxes	171,834	62,895
	$ 1,007,791	$ 915,807
Net income*	$ 1,169,341	$ 986,692
Surplus beginning of year	9,295,548	9,299,289
Treasury stock adjusted to par or stated value	1,114	39,726
Reserve for claims no longer required	65,891	.....
	$10,531,894	$10,325,707
Loss on sale of Welland, Ontario, plant	$ 16,946	.....
Transferred to reserve for contingencies	65,891	.....
Dividends paid:		
7% Preferred stock	$ 662,235	$ 662,410
Common stock	489,354	367,749
	$ 1,234,426	$ 1,030,159
Surplus end of year	$ 9,297,468	$ 9,295,548

* Without gain or loss on account of change for the year in reserve for revaluation of U. S. Government, marketable and certain investments in other companies and profit or loss on sales of securities, transferred to reserve for contingencies; in 1934, net loss $1,186.12; in 1933, net gain $329,684.62; and without deducting share of net losses, after dividends accrued of affiliated companies not consolidated; in 1934—$117,886.52; in 1933—$316,898.71.

Thomas A. Edison, Incorporated, Edison Storage Battery division, has moved its Washington, D. C., district office to the International building, 1319 F street, N. W. **J. B. Goodell** is district manager.

R. G. Angell has been transferred from the engineering service department of the **A. M. Byers Company,** Pittsburgh, Pa.,

to the railroad sales department, with headquarters at Philadelphia, Pa.

Edward M. Collins has been appointed western railroad sales representative of **S. Karpen & Bros.**, with offices at 618 Railway Exchange Building, 80 E. Jackson Blvd., Chicago.

Thomas H. Dooling, manager of the Boston, Mass., office of the **Electric Storage Battery Company,** has been transferred as manager to its San Francisco, Cal., branch.

George Gordon Crawford who was president of the **Jones & Laughlin Steel Corporation** from February, 1930 to June, 1934, and since that time served as a director and chairman of its executive committee, has resigned all his connections with the corporation to return to his home in Birmingham, Ala.

OBITUARY

Francis E. Symons, president of the Ralston Steel Car Company, Columbus, Ohio, died at his home in that city on January 23 at the age of 62 years. Mr. Symons was born at Newark, Ohio, and had been associated with the Ralston Steel Car Company for the past 28 years, having served as its president since 1921. He was also president of the Ralston Scales Corporation. Mr. Symons, who had previously been in railway service with the

Francis E. Symons

Baltimore & Ohio and the Erie, was, in 1907, elected vice-president of the Ralston Sales Company and the Ralston Steel Car Company, in which capacities he made his headquarters at New York until 1918, three years prior to his election to the Ralston presidency, when he moved to Columbus. He was a director of the American Railway Car Institute, also a member of the code authority for the railway car building industry.

Paul Willis, who retired as vice president of the McClintic-Marshall Company in 1931, died in Chicago on January 30, following a heart attack. He was born on December 21, 1863, at East Orange, N. J. and began his career as an engineer in 1885. In 1890 he organized the Kenwood Bridge Company at Chicago and was secretary and engineer until 1908 when he was elected president. He held this position until 1924 when the company was absorbed by the McClintic-Marshall Company, at which time he was made a vice president which position he held until his retirement.

B. N. Law, railroad sales manager (Central division), of the Air Reduction Sales Company, with headquarters at Chicago, died at his home in that city suddenly on February 1. Mr. Law, previous to his assignment to railroad sales work, had been manager of the Chicago district of the same company.

Financial

BOSTON & MAINE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company and the New Boston Railroad to abandon the entire line of the latter company extending from Parker, N. H., to New Boston, 5 miles.

BOYNE CITY, GAYLORD & ALPENA.—*Sale.*—This company has been sold under order of the court subject to outstanding mortgage and taxes. It was purchased by 90 per cent of the bondholders on January 5.

CHICAGO & EASTERN ILLINOIS.—*Reorganization Hearing Postponed.*—The Interstate Commerce Commission has again postponed the hearing on the proposed plan of reorganization from February 5 to April 15.

CHICAGO, ROCK ISLAND & PACIFIC.—*Abandonment.*—The Interstate Commerce Commission has authorized the trustees of this company to abandon operation of a line owned by the White & Black River Valley extending from Wiville, Ark., to Gregory, 6 miles.

DENVER & RIO GRANDE WESTERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a branch line extending from Oakdale Junction, Colo., to Tropic Mine, 2 miles.

ERIE.—*Bonds.*—This company and the Nypano, which had applied to the Interstate Commerce Commission for authority to extend for 15 years the maturity of $8,000,000 prior lien mortgage bonds of the New York, Pennsylvania & Ohio maturing March 1, have filed an amended application asking that provision be made in the contract for extension for a possible modification of the provision with respect to payment in coin or currency of the United States after the Supreme Court has rendered its decision as to the validity of the "gold clause." The Erie has applied to the Reconstruction Finance Corporation for a three-year extension of its loan of $2,775,000.

GREAT NORTHERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a segment of line extending from a point near Rexford, Mont., to the international boundary line at Gateway, 8.4 miles. See also item under Chicago, Milwaukee, St. Paul & Pacific.

GREAT NORTHERN.—*F. G. & S. Co. Bonds.*—The Interstate Commerce Commission has authorized the Farmers Grain & Shipping Company to extend to July 1, 1936, the maturity date of $438,000 of its 20-year gold bonds, with unpaid interest accrued thereon amounting to $326,000. The issue matured in 1925.

GULF & SHIP ISLAND.—*Note.*—The Interstate Commerce Commission has authorized this company to issue a note for $40,000 to be used with $3,325 in cash to meet the maturity of a loan for like total amount from the Railroad Credit Corporation.

HILL CITY.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Hill City, Minn., to Mississippi Junction, 17.5 miles, and to abandon operation over the line of the Great Northern from Mississippi Junction to Swan River, 6.7 miles.

ILLINOIS CENTRAL.—*Security for R.F.C. Loan.*—The Interstate Commerce Commission has authorized the Southern Illinois & Kentucky to issue a promissory note for $22,230,715 to be pledged to the Illinois Central which is to deposit it as collateral security for a loan from the Reconstruction Finance Corporation.

INTERSTATE.—*Equipment Trust Certificates.*—The Reconstruction Finance Corporation received two bids for an issue of $250,000 equipment trust certificates held by the Public Works Administration, ranging from 934.90 to 970.80 per thousand. The award was made to the highest bidder, Stroud & Co., Philadelphia, and associates.

NEW YORK, NEW HAVEN & HARTFORD.—*Notes.*—The Interstate Commerce Commission has authorized this company to issue, re-issue, renew or extend promissory notes totaling $19,851,748, which are in the hands of banks, trust companies and the Railroad Credit Corporation and most of which fall due during 1935.

OREGON SHORT LINE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Delco, Idaho, to Idahome, 9.61 miles.

PERE MARQUETTE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $659,000 of first mortgage 4½ per cent series C bonds to be pledged with the Railroad Credit Corporation as collateral security for short term notes.

PUGET SOUND & CASCADE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to extend for four years from August 15, 1935, the maturity date of $300,000 of first mortgage 6 per cent bonds.

SOUTHERN PACIFIC.—*Abandonment.*—The Interstate Commerce Commission has authorized this company and the Arizona Eastern to abandon 16.6 miles of the latter

company extending from a point about one mile south of West Chandler, Ariz., to Maricopa.

TENNESSEE & CAROLINA SOUTHERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon as to interstate and foreign commerce its entire line extending from Maryville, Tenn., to Calderwood, 30.5 miles.

WHEELING & LAKE ERIE.—*New Trustee Appointed.*—The New York, Chicago & St. Louis has notified the Interstate Commerce Commission that, subject to its approval it has appointed G. A. Tomlinson, of Cleveland, Ohio, as trustee of the Nickel Plate's holdings of Wheeling & Lake Erie stock, succeeding E. R. Fancher, who died on January 16.

Average Prices of Stocks and of Bonds

	Feb. 5	Last week	Last year
Average price of 20 representative railway stocks..	32.42	33.52	49.57
Average price of 20 representative railway bonds..	75.87	76.03	77.37

Dividends Declared

Bangor & Aroostook.—$.63, quarterly; Perferred, $1.75, quarterly, both payable April 1 to holders of record February 28.

Cleveland & Pittsburgh.—7 Per Cent Guaranteed, 87½c, quarterly; Special Guaranteed, 50c, both payable March 1 to holders of record February 9.

Green Bay & Western.—Capital, 1 per cent; Class A Debentures, 2½ per cent, both payable February 11 to holders of record February 8.

Railway Officers

FINANCIAL, LEGAL AND ACCOUNTING

F. D. Hauser, general claim agent of the Wabash, with headquarters at St. Louis, Mo., has had his title changed to general claims attorney.

C. L. Ferguson has been appointed treasurer of the Temiskaming & Northern Ontario, with headquarters at North Bay, Ont., in which position he assumes a portion of the duties of W. H. Maund, secretary-treasurer and assistant to general manager, who retains his other duties.

William H. Swiggart, an associate justice of the supreme court of Tennessee, has been elected general counsel of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., succeeding **Fitzgerald Hall,** who has been elected president.

William Wallace Cox, assistant comptroller for the Delaware & Hudson with headquarters at New York, has been appointed comptroller to succeed H. D. Chamberlain, whose death on January 30 was reported in the *Railway Age* of February 2. Mr. Cox was born in San Antonio, Texas, and was educated in the public schools of San Antonio and Gainesville, Tex., and at Texas Christian University. He completed a course in commercial law and accounting practices at Waco, Tex. Mr. Cox entered the service of the Gulf, Colorado & Santa Fe in April, 1907, and held various clerical accounting positions. From 1911 to 1918 he was in charge of the freight accounting depart-

William Wallace Cox

ment. In April, 1919, Mr. Cox entered the service of the Delaware & Hudson and was appointed assistant to the comptroller in February, 1921. Mr. Cox became assistant comptroller in June, 1929, the position he held until his recent appointment.

OPERATING

J. L. Palethorpe, assistant superintendent on the Canadian Pacific, with headquarters at Brandon, Man., has been appointed acting superintendent of the Edmonton division, with headquarters at Edmonton, Alta., to replace **J. H. Chown,** who has been granted a leave of absence because of ill health.

Frank B. Westenberg, chief clerk in the car service department of the Chicago & Illinois Midland, who has been promoted to superintendent of car service, as noted in the *Railway Age* of February 2, was born on April 3, 1902, at Arcola, Ill.

F. B. Westenberg

He first entered railway service on September 16, 1921, with the Illinois Traction System, where he occupied various positions in the car service and transportation departments until November 1, 1924, when he resigned to go with the Chicago, Peoria & St. Louis (now partitioned among other railroads) as per diem clerk. On November 30, 1924, Mr. Westenberg left the C. P. & St. L. to return to Illinois Traction System, as chief clerk to the yardmaster. On August 8, 1925, he was promoted to chief clerk to the car accountant, leaving this company on March 4, 1929, to go with the Chicago & Illinois Midland as chief clerk to the superintendent of car service.

W. D. Duke, general manager of the Richmond, Fredericksburg & Potomac, retired on February 1 after 40 years of service with that road. The R. F. & P. board of directors which approved Mr. Duke's request for retirement at a meeting held on January 17 voted at the same session to abolish the position of general manager, stipulating in that connection that officers heretofore reporting to Mr. Duke shall henceforth report directly to the president. Mr. Duke was born on December 11, 1872, at Richmond, Va., and was educated at Richmond College. He entered railway service in April, 1895, as

W. D. Duke

a stenographer with the Richmond, Fredericksburg & Potomac and from November, 1901, to January, 1906, he served as general manager. From January, 1906, to July, 1918, Mr. Duke was assistant to the president and general superintendent and also served as secretary and treasurer from 1906 to 1910. During the period of federal control, from 1918 to 1920, Mr. Duke served as federal manager for the R. F. & P., assuming the general managership again in the latter year and remaining in that position until his retirement. He was also general manager of the R. F. & P's highway subsidiary, the Richmond, Fredericksburg & Potomac Transportation Company.

TRAFFIC

Neil R. Markle, general agent at Chicago for the Chicago Great Western, has retired.

W. A. Armstrong, district passenger representative at Detroit, Mich., for the Canadian Pacific, has been promoted to

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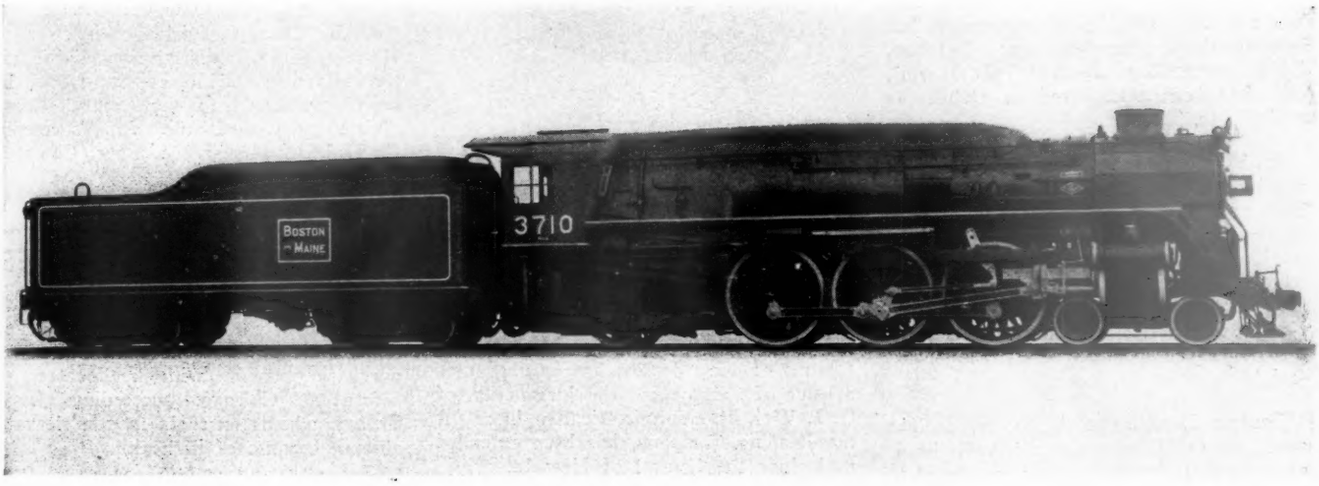
LOCOMOTIVES

FOR HIGH SPEED PASSENGER TRAINS



This stream-lined power for the Boston & Maine was specially designed to furnish high speed passenger service providing for flexibility of train weight and insuring maximum safety and passenger comfort.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA OHIO

assistant general agent, with headquarters at Chicago.

Walter M. Randall has been appointed district freight agent for the Baltimore & Ohio, with headquarters at Columbus, Ohio, succeeding **Floyd G. Stebbins,** who has been transferred to Dallas, Tex., as special representative.

Harry L. Schaeffer, assistant general passenger agent on the Missouri Pacific, with headquarters at St. Louis, Mo., has been transferred to the Western district, with headquarters at Kansas City, Mo., succeeding **I. G. Miller,** who has been transferred to St. Louis to replace Mr. Schaeffer.

L. H. Trimble, general agent for the Southern Pacific at Detroit, Mich., has been appointed general freight and passenger agent with headquarters at Phoenix, Ariz., succeeding **H. H. McClure,** who has retired. **W. J. Montgomery** has been appointed general agent at Cincinnati, Ohio, succeeding **Robert McDowell,** who has been transferred to Detroit to replace Mr. Trimble.

H. P. Norden, assistant general freight agent on the St. Louis-San Francisco, has been promoted to assistant freight traffic manager, with headquarters as before at St. Louis, Mo., succeeding **B. E. Thomas,** who becomes a member of the standing rate committee of the Southwestern Freight Bureau, at St. Louis. **C. A. Redden** has been appointed assistant general freight agent at St. Louis.

Joseph L. Sheppard, general freight agent on the Illinois Central, with headquarters at Chicago, has been appointed to the newly-created position of assistant traffic manager, with headquarters at St. Louis, Mo. **Robert A. Trovillion,** assistant general freight agent at Chicago, has been promoted to general freight agent at the same point, succeeding Mr. Sheppard. **John G. Moore,** commercial agent at New Orleans, La., has been appointed to the newly-created position of general agent at Shreveport, La.

A. K. Brittan, freight traffic agent for the Piedmont & Northern at New York, has been appointed general agent at Detroit, Mich. **W. C. Bridges,** freight traffic agent at Atlanta, Ga., has been appointed general agent, with headquarters at Chicago, Ill. **C. B. Irwin,** commercial agent at Gastonia, N. C., has been appointed general agent at Augusta, Ga. **L. F. Crenshaw,** commercial agent at Charlotte, N. C., has been appointed division freight agent, with the same headquarters. **W. F. West,** commercial agent at Greenville, S. C., has been appointed division freight agent.

George H. Dumas, assistant general coal agent of the Chicago & North Western, has been promoted to general coal agent, with headquarters as before at Chicago, succeeding **Clinton McCullough,** deceased. Mr. Dumas has been connected with the North Western for 22 years. He was born in 1895 at Escanaba, Mich., and entered the service of this company in 1913 as a clerk in the office at Escanaba. Later he was transferred to Houghton, Mich., and in 1917 he was appointed agent at Iron River, Mich. In 1920 Mr. Dumas was appointed traveling agent at Indianapolis, Ind., where he

G. H. Dumas

served for 11 years. In 1931 he was transferred to Madison, Wis., and then to Chicago. He has held the position of assistant general coal agent since November, 1932.

MECHANICAL

J. S. Hagan, electrical engineer for the Central of New Jersey, has been granted a leave of absence and the jurisdiction of **G. I. Wright,** chief electrical engineer for the Reading Company, has been extended to include the Central of New Jersey.

W. M. English, acting superintendent of motive power, Chicago, Indianapolis & Louisville, has been appointed superintendent of motive power, effective February 1, with headquarters at Lafayette, Ind., as before.

J. L. Carver, engineer of tests of the Illinois Central, whose promotion to mechanical engineer was noted in the

J. L. Carver

Railway Age of January 26, was born on December 10, 1891, at West Medford, Mass. He was educated at the Armour Institute of Technology, at Chicago, graduating in 1914, and entered the service of the Illinois Central on October 1 of the same year as a clerk in the car department at Chicago. On March 9, 1915, Mr. Carver entered the test department, serving as a chemist and material inspector until September 1, 1916, when he was advanced to assistant chief chemist in the test department. On December 10, 1917, he left the service to join the United States Army where he served in the ordinance branch until January 1, 1919, when he returned to the I. C. as assistant chief chemist. After a month in this position he was promoted to engineer of tests, which position he held until his recent appointment as mechanical engineer, effective January 16. His office is at Chicago.

ENGINEERING AND SIGNALING

C. E. Cherry, division engineer of the Illinois and St. Louis terminal divisions of the Missouri Pacific at St. Louis, has been transferred to the Central Kansas division at Osawatomie, Kan., succeeding **C. Halpin,** who succeeds Mr. Cherry at St. Louis.

PURCHASES AND STORES

J. F. McAlpine, chief clerk to the purchasing agent of the Chicago, Burlington & Quincy, has been appointed assistant purchasing agent, with headquarters as before at Chicago, succeeding **J. G. Stuart,** who is on a six months' leave of absence because of ill health.

OBITUARY

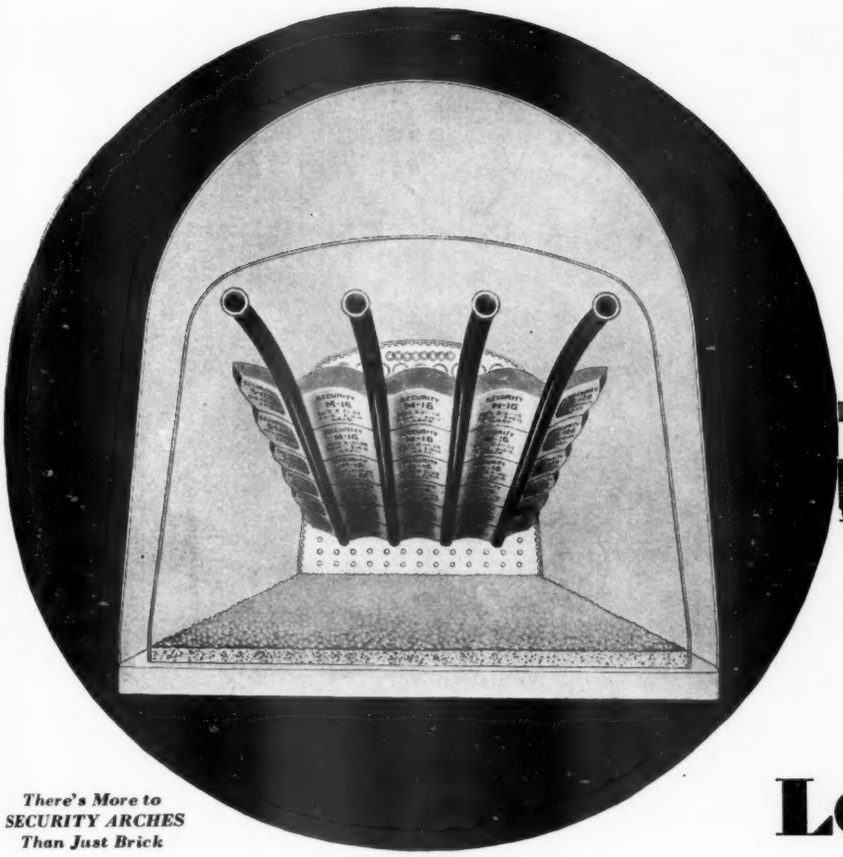
William Hart Wilson, formerly assistant to vice-president of the Northern Pacific, died on January 28 at his home in St. Paul, Minn., at the age of 70.

James M. Seibert, who retired in 1928 as real estate and tax commissioner for the Missouri Pacific, died on January 23 at his home at St. Louis, Mo., at the age of 87 years.

George H. Lohmeyer, who resigned several months ago because of ill health, as general agent at Detroit, Mich., for the Terminal Railroad Association of St. Louis, died at the Missouri Pacific Hospital at St. Louis on January 23.

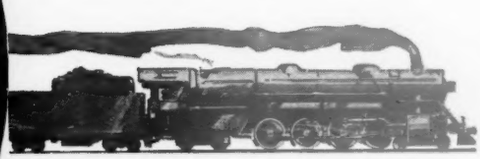
Roscoe Hooper, superintendent of telegraph of the Kansas City Southern, with headquarters at Kansas City, Mo., died at that point on January 22, of a heart attack. Mr. Hooper was born at Leesburg, Tex., on March 4, 1882, and entered the service of the Kansas City Southern on February 10, 1899, as a telegrapher. After serving in various clerical capacities, including that of chief clerk, superintendent of telegraph, and as chief dispatcher, he was appointed superintendent of telegraph on December 15, 1918, which position he continued to hold until his death.

Tables of Revenues and Expenses of Railways begin on next left-hand page



There's More to SECURITY ARCHES Than Just Brick

EVERY CLASS OF LOCOMOTIVE



Is a Job Unto Itself

Application of the Security Arch is not merely a matter of arch tubes and brick — every design and size of firebox is carefully studied and a proper arch design is prepared to meet its needs.

The finished arch represents the best that 25 years has taught in ceramics and in brick arch design — experience that only the American Arch Company organization has at its disposal.

Yet even though individual brick arch designs are prepared for every class of locomotive, Security Arch Brick is highly standardized — six standard patterns cover more than 50% of all brick arch applications.

Today a quarter of a century after Security Arch Brick was introduced by the American Arch Company, Security Brick Arch Designs and Security brick shapes are the up-to-date standard in the Railroad World.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

NRA MEMBER U.S. WE DO OUR PART

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1934

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1933
Akron, Canton & Youngstown	Dec.	171	$140,350	$39	$149,680	$15,766	$10,960	$7,587	$44,886	$10,670	$89,811	60.0	$59,869	$49,864	$36,534	$27,667
	12 mos.	171	1,618,417	443	1,721,879	250,806	168,189	91,147	526,268	106,682	1,142,323	66.3	579,556	455,466	286,761	322,599
Alton	Dec.	949	733,488	155,269	1,054,042	135,842	177,362	38,721	447,346	42,068	854,066	81.0	199,976	148,895	9,505	346,193
	12 mos.	949	9,599,422	1,724,892	13,159,346	2,044,389	2,000,030	528,540	5,147,224	500,300	10,345,877	78.6	2,813,469	1,955,187	221,040	1,847,341
Atchison, Topeka & Santa Fe	Dec.	9,517	6,134,976	990,627	8,190,115	1,012,032	2,414,681	333,914	3,290,677	505,214	7,548,420	92.2	641,695	229,622	379,681	871,870
	12 mos.	9,536	86,318,292	11,049,686	107,268,205	13,212,019	26,669,194	3,734,672	36,625,156	5,130,273	85,407,421	79.6	21,860,784	12,901,222	14,166,811	12,705,559
Gulf, Colorado & Santa Fe	Dec.	1,918	773,102	63,088	926,235	228,019	197,464	44,630	365,453	85,339	909,227	98.2	17,008	—15,456	—82,211	86,600
	12 mos.	1,918	10,461,816	606,626	11,991,431	2,327,338	2,585,219	537,325	4,642,276	839,625	10,917,779	91.0	1,073,652	170,516	—692,578	—85,154
Panhandle & Santa Fe	Dec.	1,878	541,742	28,841	624,346	82,934	114,106	15,194	211,546	40,152	463,362	74.2	160,984	123,830	62,997	111,675
	12 mos.	1,878	7,940,522	314,330	8,834,312	998,525	1,589,174	195,871	2,549,205	427,040	5,758,280	65.2	3,076,032	2,550,687	1,755,092	1,341,355
Atlanta & West Point	Dec.	93	73,198	20,421	118,609	17,091	23,816	6,655	51,472	7,027	108,300	91.3	10,309	2,214	—26,685	—23,088
	12 mos.	93	963,816	209,386	1,411,665	223,133	310,672	80,739	594,398	88,364	1,324,189	93.8	87,476	17	—153,636	—231,983
Western of Alabama	Dec.	133	67,567	21,199	106,293	27,388	31,397	6,624	44,755	5,792	117,999	111.0	—11,706	—14,595	—19,213	4,152
	12 mos.	133	913,117	217,115	1,298,765	245,930	368,131	81,248	529,815	80,204	1,327,032	102.2	—28,267	—119,201	—55,651	—84,879
Atlanta, Birmingham & Coast	Dec.	639	192,213	10,493	233,691	42,756	44,038	21,519	102,417	20,810	242,554	103.7	—8,863	—27,041	—43,327	—16,191
	12 mos.	639	2,389,677	87,140	2,818,836	495,604	589,890	254,383	1,181,129	215,765	2,855,871	101.3	—37,035	—195,488	—333,300	—250,846
Atlantic Coast Line	Dec.	5,147	2,402,146	450,595	3,381,140	369,894	639,423	138,600	1,312,918	135,005	2,632,873	77.9	748,267	642,886	504,731	562,912
	12 mos.	5,145	29,791,282	5,035,918	39,533,828	4,893,110	7,871,135	1,378,234	14,879,800	1,550,275	30,897,535	78.2	8,636,293	5,068,415	4,289,557	4,299,811
Charleston & Western Carolina	Dec.	342	133,042	1,394	139,130	23,090	20,897	5,820	52,354	4,427	106,379	76.5	32,751	26,582	30,750	40,889
	12 mos.	342	1,834,690	16,770	1,904,330	273,492	292,313	68,496	636,454	56,939	1,327,485	69.7	576,845	396,043	381,262	435,489
Baltimore & Ohio	Dec.	6,440	8,845,818	885,450	10,525,891	788,661	2,184,531	331,207	3,872,410	551,313	7,832,928	74.4	2,692,963	2,018,465	1,775,121	1,626,523
	12 mos.	6,399	116,298,463	10,147,702	135,539,395	11,784,790	28,038,000	4,219,618	47,445,840	6,682,798	99,337,784	73.3	36,201,611	28,238,915	23,677,939	28,849,201
Staten Island Rapid Transit	Dec.	23	29,386	73,359	110,798	12,100	13,600	1,483	91,800	12,826	131,809	119.0	—21,011	—38,512	—66,058	—8,237
	12 mos.	23	586,159	962,995	1,649,401	145,337	159,334	20,292	982,970	154,183	1,462,116	88.6	187,285	—5,625	—242,796	12,675
Bangor & Aroostook	Dec.	603	434,663	25,604	483,276	75,611	77,094	4,657	126,799	30,477	315,369	65.3	167,907	121,936	114,508	184,437
	12 mos.	603	5,660,931	273,081	6,167,890	1,081,399	1,034,966	57,746	1,428,004	314,088	3,926,030	63.7	2,241,860	1,712,776	1,693,743	1,741,500
Bessemer & Lake Erie	Dec.	225	317,828	828	325,708	65,482	276,576	11,814	125,979	38,401	518,250	159.1	—192,542	—194,133	—170,277	—42,024
	12 mos.	225	8,203,004	8,841	8,304,765	1,161,233	3,356,709	132,916	1,702,605	458,937	6,810,295	82.	1,494,470	1,171,613	1,307,203	1,703,552
Boston & Maine	Dec.	2,038	2,351,795	556,407	3,490,540	7,729	267,807	60,527	1,489,876	89,291	1,922,684	55.1	1,567,856	1,326,654	1,190,117	419,210
	12 mos.	2,046	29,236,170	6,762,794	42,155,612	5,234,021	5,811,919	713,043	17,070,664	1,939,302	30,872,270	73.2	11,283,342	8,820,961	6,893,515	7,068,315
Brooklyn Eastern District Terminal	Dec.	11.27	68,285	.....	70,722	4,847	8,751	252	23,878	6,398	44,126	62.6	26,596	19,925	19,925	14,090
	12 mos.	11.27	928,099	.....	953,418	56,458	109,278	3,914	307,714	64,336	541,700	56.8	411,718	332,991	332,991	331,484
Burlington-Rock Island	Dec.	280	52,629	4,283	61,613	14,323	13,909	3,891	40,915	9,164	72,875	118.3	—11,262	—16,929	—23,247	—6,491
	12 mos.	280	706,879	32,799	791,543	156,555	157,921	46,864	465,452	96,515	913,942	115.5	—122,399	—201,942	—283,443	—37,376
Cambria & Indiana	Dec.	37	90,419	.....	90,564	5,060	69,076	348	12,162	6,608	93,254	102.97	—2,690	—12,144	58,437	87,655
	12 mos.	37	1,044,013	.....	1,046,514	92,489	703,426	4,548	151,522	81,020	1,033,005	98.71	13,509	—127,072	657,824	949,124
Canadian Pacific Lines in Maine	Dec.	233	149,121	18,753	182,301	16,723	38,214	7,992	71,279	5,503	140,459	77.1	41,842	35,762	6,578	1,075
	12 mos.	233	1,635,242	191,669	1,985,675	377,334	373,379	104,719	774,802	67,222	1,705,736	85.9	279,939	203,817	—38,382	—108,473
Canadian Pacific Lines in Vermont	Dec.	85	51,568	11,010	77,040	4,000	17,999	3,552	51,242	4,434	81,533	105.8	—4,493	—7,474	—25,276	—39,755
	12 mos.	85	634,774	122,124	930,135	172,650	232,556	46,648	627,952	53,714	1,137,026	122.2	—206,891	—265,992	—462,482	—397,753
Central of Georgia	Dec.	1,926	818,235	111,005	1,079,347	106,173	222,540	51,814	448,891	95,110	928,579	86.0	150,768	62,258	27,785	33,787
	12 mos.	1,926	10,660,080	1,151,774	13,353,151	1,531,852	2,863,369	588,984	5,354,413	949,339	11,340,897	84.9	2,012,254	1,120,862	675,683	636,011
Central New Jersey	Dec.	687	1,907,418	330,834	2,426,211	86,673	391,132	42,419	977,713	138,444	1,652,050	68.1	774,161	286,830	186,768	37,786
	12 mos.	689	22,621,220	4,465,517	29,022,116	1,653,109	4,972,514	523,224	11,622,633	1,295,909	20,247,793	69.8	8,774,323	4,207,393	3,060,752	2,253,768
Central Vermont	Dec.	455	307,884	30,446	377,706	42,622	56,963	13,659	205,502	19,445	338,217	89.5	39,489	24,200	13,502	26,582
	12 mos.	455	4,019,616	445,907	4,953,347	813,915	978,172	156,682	2,330,011	263,486	4,542,744	91.7	410,603	219,168	109,574	328,421
Chesapeake & Ohio	Dec.	3,145	7,624,250	266,612	8,201,947	553,312	1,580,687	201,500	1,895,607	299,141	4,536,792	55.3	3,665,155	2,879,775	2,866,028	2,732,272
	12 mos.	3,136	102,349,723	2,899,329	109,489,077	11,043,840	19,912,974	2,049,632	24,284,970	3,389,100	60,814,973	55.5	48,674,104	38,361,751	36,997,795	36,967,128
Chicago & Eastern Illinois	Dec.	938	857,282	121,941	1,124,433	105,573	157,323	51,777	441,961	Cr. 27,297	720,147	64.0	404,286	379,199	260,968	87,853
	12 mos.	938	10,021,464	1,217,607	12,776,551	1,576,796	1,961,683	602,188	5,084,030	669,902	9,945,374	77.8	2,831,177	2,141,489	641,697	207,297
Chicago & Illinois Midland	Dec.	131	258,799	1,630	266,706	23,346	47,975	18,637	71,072	19,805	180,833	67.8	85,873	74,134	81,085	124,290
	12 mos.	131	2,871,854	13,092	2,974,212	346,512	617,685	186,622	763,188	208,603	2,122,611	71.4	851,601	740,534	804,488	1,003,023
Chicago & North Western	Dec.	8,428	4,014,350	788,141	5,485,379	611,792	1,006,698	138,432	2,283,396	356,834	4,420,351	80.6	1,065,028	658,083	417,338	183,369
	12 mos.	8,441	58,789,260	8,675,144	75,893,418	10,776,858	15,528,402	1,943,869	29,403,295	3,818,840	61,811,820	81.4	14,081,598	7,956,871	5,202,104	6,031,714
Chicago, Burlington & Quincy	Dec.	9,036	4,832,849	620,096	6,330,189	581,919	1,005,582	220,622	2,438,340	417,728	4,710,662	74.4	1,619,527	1,347,722	1,050,470	1,254,436
	12 mos.	9,143	64,815,018	6,749,238	80,288,159	9,860,327	12,431,389	2,527,663	28,564,565	4,082,234	58,007,982	72.2	22,280,177	16,471,456	12,650,936	13,491,225
Chicago Great Western	Dec.	1,511	1,037,972	56,263	1,197,052	112,184	108,086	50,263	474,005	75,099	819,648	68.5	377,404	367,695	169,430	267,817
	12 mos.	1,517	13,783,204	525,209	15,491,939	1,965,497	2,188,006	609,144	5,841,332	696,740	11,291,717	72.9	4,200,222	3,641,983	1,340,269	1,280,914
Chicago, Indianapolis & Louisville	Dec.	647	485,543	52,370	618,864	47,026	109,178	24,276	230,725	38,577	457,359	73.9	161,505	579,542	488,726	37,811
	12 mos.	644	5,950,919	577,245	7,427,499	676,841	1,687,002	299,891	3,071,906	363,108	6,168,313	83.0	1,259,186	1,250,242	119,800	—21,083

Continued on next left-hand page

Courtesy Seamen's Church Institute of New York

Times Have Changed

Improvement in ship propulsion has been brought about by the use of steam.

Improvement in locomotive operation has been brought about by the use of *exhaust* steam for heating feed water—by reclaiming and utilizing waste heat.

For this purpose, two types of Elesco equipment are available: the closed or non-contact heater type, the open or exhaust-steam-injector type. Each type satisfies certain conditions or preferences. But the result with either type is the saving of a considerable part of the heat, otherwise wasted up the stack, and returning this heat to the boiler through the feed water.

The wide application of both types of Elesco feed water heating equipment, and the operating improvement and increased economy they effect, warrant investigation of their possibilities on your power.

THE SUPERHEATER COMPANY

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ELESCO

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Superheaters - Feed Water Heaters - Exhaust Steam Injectors - Superheated Steam Pyrometers - American Throttles

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1934—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1933
Chicago, Milwaukee, St. Paul & Pacific	Dec.	11,160	$5,329,984	$580,290	$6,708,923	$844,738	$1,204,597	$200,974	$2,868,342	$400,042	$5,545,503	82.7	$1,163,420	$708,091	$306,715	$279,904
	12 mos.	11,172	73,382,543	5,616,950	87,859,792	12,851,519	16,849,617	2,456,437	33,346,658	3,819,533	69,655,547	79.3	18,204,245	11,775,745	6,539,054	8,597,319
Chicago, Rock Island & Pacific	Dec.	7,576	3,554,551	583,823	4,709,867	499,554	1,002,129	174,760	2,290,976	367,739	4,403,008	93.5	306,859	165,160	—100,451	86,185
	12 mos.	7,596	51,271,506	5,694,866	63,328,500	6,768,563	14,435,045	2,158,096	26,138,712	3,831,778	54,082,631	85.4	9,245,869	5,098,903	1,727,645	3,289,282
Chicago, Rock Island & Gulf	Dec.	721	250,941	19,691	282,163	44,278	31,590	15,722	118,057	26,584	238,906	84.7	43,257	25,791	—26,312	—13,811
	12 mos.	721	3,327,910	240,484	3,633,188	529,217	434,471	189,642	1,352,507	257,609	2,792,558	76.9	840,630	605,821	—48,845	—291,715
Chicago, St. Paul, Minn. & Omaha	Dec.	1,654	955,505	140,202	1,208,044	197,218	188,252	28,952	639,729	84,729	1,148,530	95.1	59,514	—19,990	—70,754	76,015
	12 mos.	1,660	12,332,527	1,363,654	14,848,618	1,789,582	2,341,494	378,181	6,952,399	924,862	12,490,880	84.1	2,357,738	1,454,950	601,985	1,537,544
Clinchfield Railroad	Dec.	309	402,086	4,515	411,176	27,281	81,460	14,693	90,910	12,883	227,227	55.3	183,949	138,700	155,618	174,914
	12 mos.	309	5,102,663	40,818	5,204,649	448,639	1,192,082	186,759	1,010,579	160,767	2,998,826	57.6	2,205,823	1,725,488	2,043,294	1,894,874
Colorado & Southern	Dec.	1,019	377,569	24,066	453,273	46,175	89,079	12,392	180,669	46,710	375,930	82.9	77,343	19,138	—972	12,783
	12 mos.	1,025	4,749,550	310,959	5,618,296	758,426	1,134,162	139,666	2,120,478	430,121	4,591,882	81.7	1,026,414	362,474	144,619	255,823
Fort Worth & Denver City	Dec.	804	308,601	36,091	413,307	37,071	73,627	15,132	167,927	38,161	335,511	81.2	77,796	52,461	22,985	171,784
	12 mos.	804	4,510,505	416,806	5,650,343	427,644	823,287	193,204	1,796,456	417,445	3,685,126	65.2	1,965,217	1,623,361	1,239,355	1,567,283
Columbus & Greenville	Dec.	167	57,534	10,745	73,829	17,218	13,091	3,922	33,330	11,230	78,791	106.7	—4,962	—12,495	—10,893	—16,208
	12 mos.	167	729,956	76,722	875,249	185,867	142,309	44,276	367,931	108,130	848,444	96.9	26,805	—20,490	—3,410	92,142
Delaware & Hudson	Dec.	848	1,643,750	82,298	1,814,828	239,917	Cr.263,234	46,803	725,948	180,271	931,107	51.3	883,721	808,556	833,042	134,839
	12 mos.	848	20,830,483	1,135,799	23,176,469	3,372,083	5,589,243	578,222	8,946,762	1,828,700	20,381,924	87.9	2,794,545	1,948,647	2,118,875	1,016,991
Delaware, Lackawanna & Western	Dec.	992	2,526,791	585,084	3,564,325	205,762	763,943	106,527	1,666,854	151,619	2,912,384	81.7	651,941	257,671	242,765	284,671
	12 mos.	992	32,567,939	6,557,815	44,592,530	3,728,663	8,760,476	1,286,217	19,649,050	1,942,332	35,506,791	79.6	9,085,739	4,779,660	4,504,180	3,480,300
Denver & Rio Grande Western	Dec.	2,634	1,425,031	87,708	1,605,455	92,176	320,672	47,360	554,837	107,541	1,127,854	70.3	477,601	317,035	269,977	360,718
	12 mos.	2,559	17,168,316	990,731	19,246,850	2,259,508	4,309,191	552,992	6,364,088	1,098,593	14,645,261	76.1	4,601,589	2,737,541	2,311,564	3,357,643
Denver & Salt Lake	Dec.	232	165,690	4,980	181,564	Cr. 48,815	13,226	1,407	34,515	Cr. 707	Cr. 7,834	...	189,398	170,927	210,095	63,082
	12 mos.	232	1,454,747	42,517	1,620,006	93,941	251,474	18,474	332,965	134,366	814,851	50.3	805,155	638,646	913,122	711,349
Detroit & Mackinac	Dec.	242	30,312	2,112	37,973	6,713	Cr. 5,770	860	22,456	13,634	37,896	99.8	77	—22,263	—23,341	—1,089
	12 mos.	242	530,785	31,770	632,903	114,118	79,707	10,311	254,831	55,376	514,333	81.3	118,570	116,813	101,920	46,845
Detroit & Toledo Shore Line	Dec.	50	279,310	.....	282,049	12,534	17,608	7,600	68,098	8,971	114,803	40.7	167,246	120,836	67,628	105,110
	12 mos.	50	2,931,952	.....	2,952,066	221,038	261,268	82,642	744,086	90,604	1,399,495	47.4	1,552,571	1,269,821	731,070	570,755
Detroit, Toledo & Ironton	Dec.	472	522,379	325	540,076	40,900	75,359	9,819	121,632	23,316	266,468	49.3	273,608	214,518	185,886	130,943
	12 mos.	472	5,652,446	3,192	5,837,776	532,402	801,884	117,900	1,359,314	236,981	3,005,028	51.5	2,832,748	2,219,904	1,953,028	1,076,319
Duluth, Missabe & Northern	Dec.	560	58,883	4,705	84,372	93,693	165,144	3,950	132,595	49,855	444,894	527.3	—360,522	—401,749	—393,428	—574,495
	12 mos.	562	8,154,472	38,612	9,486,593	1,465,148	2,468,872	38,199	2,219,869	526,268	6,717,413	70.8	2,769,180	1,958,535	1,981,648	3,408,234
Duluth, Winnipeg & Pacific	Dec.	178	83,252	2,902	89,466	12,742	21,682	Cr. 332	37,756	3,977	75,818	84.7	13,648	9,763	10,938	3,663
	12 mos.	178	847,650	29,860	912,727	230,097	214,493	20,482	423,066	61,946	949,716	104.1	—36,989	—83,921	—43,050	71,442
Elgin, Joliet & Eastern	Dec.	446	755,745	.....	824,188	65,371	190,734	12,633	344,627	56,488	669,853	81.3	154,335	166,100	150,576	106,898
	12 mos.	446	9,268,106	39	10,289,344	1,066,738	2,522,818	149,943	4,001,975	603,286	8,344,359	81.1	1,944,985	1,057,855	661,634	928,388
Erie Railroad	Dec.	2,304	4,683,204	427,602	5,589,387	455,848	1,128,040	156,025	2,166,318	282,178	4,195,733	75.1	1,393,654	1,105,297	790,097	759,477
	12 mos.	2,310	63,967,325	5,223,021	75,064,122	6,887,750	15,172,539	1,912,459	26,920,467	3,362,983	54,311,372	72.4	20,752,750	16,783,384	12,699,832	12,523,148
New Jersey & New York	Dec.	45	14,633	49,810	66,528	3,874	27,071	1,291	52,505	2,807	87,548	131.6	—21,020	—24,531	—41,968	—24,848
	12 mos.	45	185,458	619,935	828,269	82,475	290,442	14,894	592,661	40,640	1,021,112	123.3	—192,843	—242,043	—436,831	—334,357
New York, Susquehanna & Western	Dec.	215	259,350	24,275	301,740	30,691	52,951	4,695	123,959	11,992	224,288	74.3	77,452	70,989	42,180	60,158
	12 mos.	215	3,110,956	306,856	3,606,660	427,790	687,857	52,677	1,436,511	144,169	2,748,994	76.2	857,666	593,152	343,186	308,659
Florida East Coast	Dec.	811	435,859	132,375	676,835	105,502	156,528	24,849	221,990	41,694	557,138	82.3	119,697	103,829	65,543	83,782
	12 mos.	821	4,864,024	1,724,852	7,609,612	1,336,501	1,594,653	247,619	2,388,843	497,392	6,142,288	80.7	1,467,324	700.041	225,476	—134,911
Fort Smith & Western	Dec.	249	53,487	1,359	57,940	13,996	10,396	5,140	18,427	4,454	52,562	90.7	5,378	3,500	—1,360	2,595
	12 mos.	249	623,622	12,713	679,063	170,706	119,657	65,535	225,517	48,818	625,252	92.1	53,811	32,679	—29,464	—4,895
Georgia Railroad	Dec.	329	185,600	17,170	233,007	19,970	46,081	14,952	98,290	11,926	191,519	82.2	41,488	35,536	70,651	24,005
	12 mos.	329	2,705,293	169,469	3,157,426	308,824	639,284	194,421	1,323,592	152,610	2,623,593	83.1	533,833	468,987	578,961	537,712
Georgia & Florida	Dec.	408	64,780	3,208	72,033	16,034	15,937	7,397	32,474	5,827	77,534	107.6	—5,501	—9,174	—11,184	—9,383
	12 mos.	453	940,814	30,112	1,029,239	236,893	205,699	89,738	404,244	73,700	1,010,546	98.2	18,693	—45,917	—61,604	—21,191
Grand Trunk Western	Dec.	1,006	1,139,531	66,601	1,310,564	147,570	255,098	23,433	656,349	66,699	1,152,559	87.9	158,005	126,872	78,003	—114,884
	12 mos.	1,007	15,055,574	807,453	17,158,392	2,465,712	3,582,564	384,898	7,339,569	1,067,675	14,867,118	86.7	2,291,274	1,441,003	392,467	—954,401
Canadian National Lines in New Eng.	Dec.	172	69,720	7,700	86,328	19,501	11,895	Cr. 60	35,515	8,678	75,739	87.7	10,589	8,387	—27,976	—90,464
	12 mos.	172	874,470	80,067	1,053,675	288,963	227,065	30,129	614,138	114,691	1,279,938	121.5	—226,263	—354,831	—790,269	—815,522
Great Northern	Dec.	8,328	4,060,025	427,357	5,092,411	417,718	807,183	119,026	1,986,717	197,771	3,582,837	70.4	1,509,574	1,340,520	1,204,308	830,037
	12 mos.	8,344	60,348,273	4,220,571	70,752,877	8,368,883	11,846,694	1,899,765	23,032,746	2,778,343	48,610,180	68.7	22,142,697	15,951.058	14,101,650	11,810,227
Green Bay & Western	Dec.	233	89,032	1,466	95,074	13,768	12,521	4,781	21,745	5,693	58,469	61.4	36,605	30,218	22,441	20,991
	12 mos.	233	1,051,808	12,001	1,117,539	242,144	202,074	56,577	461,922	46,734	1,009,142	90.3	108,397	45,790	21,931	86,972
Gulf & Ship Island	Dec.	259	65,228	10,595	88,146	14,599	13,582	2,728	44,480	4,812	80,411	91.2	7,735	9,453	3,104	—4,427
	12 mos.	260	898,617	92,033	1,140,281	177,476	181,666	30,527	560,762	55,418	1,007,418	88.3	132,863	—37,812	—150,098	—160,503

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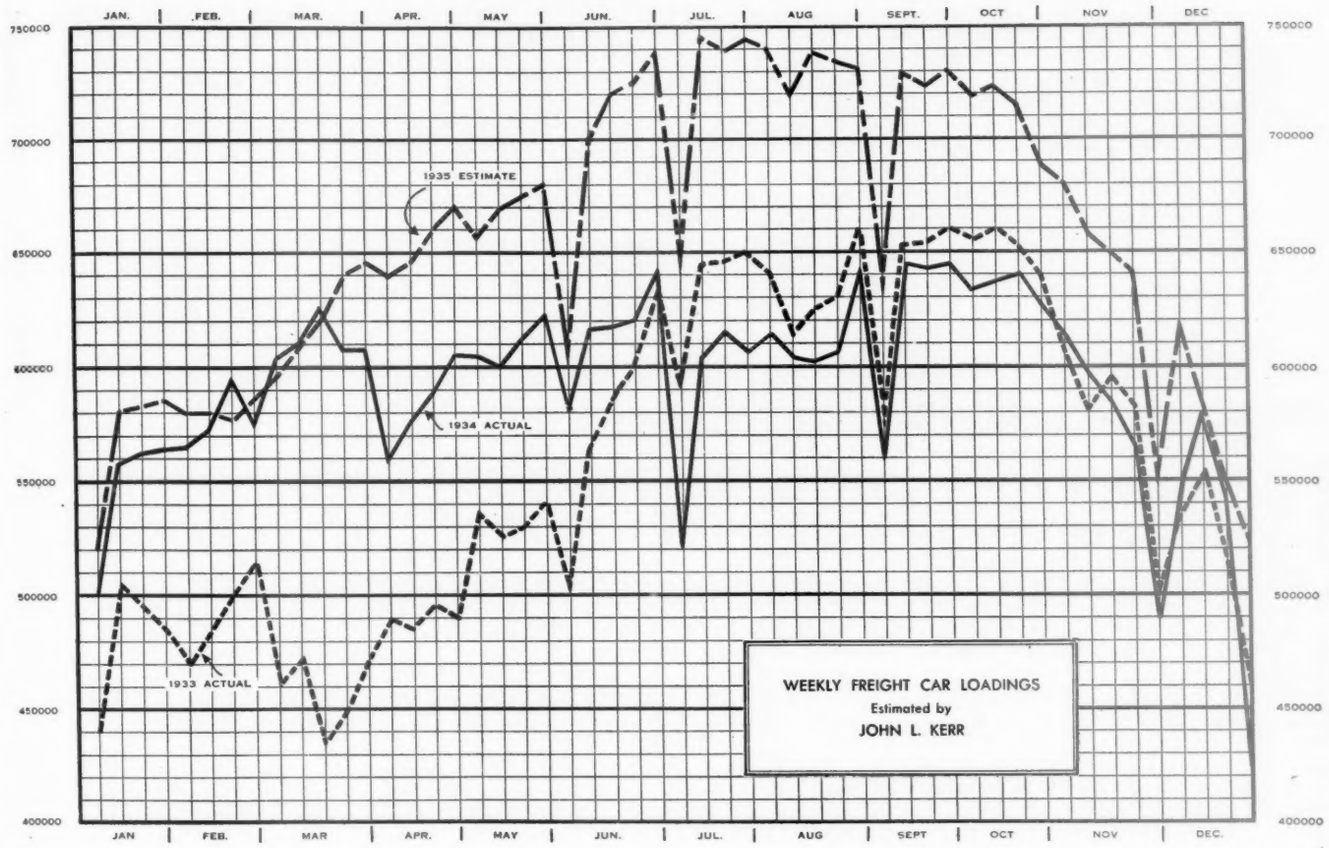
"GOING UP!"



MR. JOHN L. KERR, a railroad economist, for years has been making surprisingly accurate estimates of carloadings. ● In 1932 he correctly predicted a contra seasonal decline during the first half of the year and estimated total carloadings to be 27,300,000. Actual carloadings were 28,179,000. ● Early in 1933, he published his forecast of a spring rise and no seasonal expansion in the fall. He estimated total carloadings of 31,000,000 against an actual of 28,960,000, the large difference being attributable mostly to the unforeseen bank holiday. ● In 1934 he correctly predicted a falling off of traffic during the summer with no fall expansion. He estimated total loadings to be 30,703,000 as against an actual of 30,785,000. ● His estimate for 1935, herewith reproduced, predicts an expansion of carloadings starting in March and continuing throughout the summer. He estimates that the total carloadings will be 34,125,000 in the year 1935. ● Such accurate forecasting merits much more than just passing attention. His past record is such that due concern should be felt concerning the ability to handle this predicted traffic with present motive power facilities.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET • NEW YORK • N.Y.

Revenues and Expenses of Railways

Month of December and Twelve Months of Calendar Year 1934—Continued

Name of road	Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net Ty. operating income, 1933
Gulf, Mobile & Northern															
Dec.	961	$382,260	$28,039	$430,017	$50,896	$61,254	$34,536	$139,860	$31,427	$318,173	73.99	$111,844	$100,841	$56,797	$39,165
12 mos.	961	4,758,344	237,102	5,230,957	677,681	772,424	401,446	1,619,844	321,253	3,785,019	72.36	1,445,938	1,093,619	512,547	747,432
Dec.	4,973	5,331,031	802,052	6,882,848	534,465	1,258,771	206,417	2,619,608	324,267	4,977,833	72.3	1,905,015	1,704,441	1,610,178	1,962,734
12 mos.	4,998	64,016,958	8,510,440	79,228,255	6,752,904	16,251,789	2,194,886	29,701,094	3,870,877	59,154,117	74.7	20,074,138	15,030,717	12,688,092	15,371,241
Illinois Central															
Dec.	1,635	798,051	92,346	972,626	88,763	130,494	28,602	395,663	49,646	693,036	71.3	279,590	216,539	143,751	313,767
12 mos.	1,639	10,246,436	894,398	11,916,718	1,007,759	1,869,112	316,144	4,888,063	616,484	8,701,283	73.0	3,215,435	1,919,269	734,093	1,451,846
Yazoo & Mississippi Valley															
Dec.	6,609	6,329,082	894,398	7,855,474	623,228	1,389,265	235,019	3,015,271	373,913	5,670,869	72.2	2,184,605	1,763,714	1,763,714	2,285,630
12 mos.	6,638	74,263,394	9,310,895	91,144,973	7,760,663	18,120,901	2,511,030	34,589,157	4,487,361	67,855,400	74.4	23,289,573	16,920,437	13,543,614	16,938,148
Illinois Central System															
Dec.	525	336,645	67,944	440,781	27,881	62,237	14,881	153,841	22,418	281,852	63.94	158,929	142,153	125,315	87,454
12 mos.	525	3,851,771	687,995	4,930,061	560,990	718,200	174,826	1,740,498	224,448	3,427,882	69.53	1,502,179	1,206,648	1,003,617	883,962
Dec.	878	602,012	21,488	720,912	81,107	157,436	45,601	211,551	82,069	579,766	80.42	141,146	43,089	13,516	46,521
12 mos.	878	8,279,077	214,524	9,650,064	911,718	1,644,293	569,914	3,060,842	896,171	7,095,617	73.53	2,554,447	1,776,647	1,291,453	1,161,674
Kansas City Southern															
Dec.	326	143,820	4,728	146,901	10,302	15,555	7,435	36,671	10,262	64,066	43.6	82,835	76,688	64,491	33,407
12 mos.	326	1,836,621	137	1,875,510	228,678	179,643	86,813	440,336	110,157	999,488	53.3	876,022	717,016	521,824	453,228
Dec.	160	27,790	1,739	29,487	18,871	22,537	527	18,946	7,264	68,145	231.1	—38,658	—42,252	—43,939	—25,439
12 mos.	160	1,235,543	1,422,948	293,893	238,583	7,594	308,655	79,056	927,702	65.2	—495,246	291,978	270,648	762,909
Kansas, Oklahoma & Gulf															
Dec.	96	117,845	2,269	119,046	9,107	17,776	3,157	40,896	8,900	79,834	67.1	39,212	31,672	19,853	5,472
12 mos.	96	1,412,671	335	1,447,588	173,020	239,646	38,196	487,802	87,208	1,025,870	70.9	421,718	298,078	151,689	181,337
Dec.	220	260,385	5,194	262,468	36,129	63,976	5,028	102,140	17,526	224,797	85.6	37,671	83,472	75,854	
12 mos.	226	3,423,351	3,455,844	435,568	769,815	62,339	1,200,107	199,051	2,666,758	77.2	789,086	761,746	702,257		
Lake Superior & Ishpeming															
Dec.	1,354	2,828,411	241,596	3,315,814	144,930	560,763	102,998	1,464,916	137,573	2,427,566	73.2	888,248	838,369	742,265	291,062
12 mos.	1,353	34,462,892	2,468,176	39,866,526	2,960,674	7,232,181	1,307,943	17,606,844	1,611,228	30,921,804	67.7	8,944,722	6,934,571	5,338,991	4,107,569
Dec.	608	348,746	9,669	383,213	57,439	55,826	25,215	94,486	25,866	259,368	65.7	123,845	86,132	72,988	68,702
12 mos.	608	4,042,296	107,228	4,467,631	573,912	730,717	292,705	1,094,117	248,238	2,941,604	65.8	1,526,027	1,007,116	919,772	
Lehigh & Hudson River															
Dec.	96	117,845	2,269	119,046	9,107	17,776	3,157	40,896	8,900	79,834	67.1	39,212	31,672	19,853	5,472
12 mos.	96	1,412,671	335	1,447,588	173,020	239,646	38,196	487,802	87,208	1,025,870	70.9	421,718	298,078	151,689	181,337
Dec.	220	260,385	5,194	262,468	36,129	63,976	5,028	102,140	17,526	224,797	85.6	37,671	83,472	75,854	
12 mos.	226	3,423,351	3,455,844	435,568	769,815	62,339	1,200,107	199,051	2,666,758	77.2	789,086	761,746	702,257		
Lehigh & New England															
Dec.	1,354	2,828,411	241,596	3,315,814	144,930	560,763	102,998	1,464,916	137,573	2,427,566	73.2	888,248	838,369	742,265	291,062
12 mos.	1,353	34,462,892	2,468,176	39,866,526	2,960,674	7,232,181	1,307,943	17,606,844	1,611,228	30,921,804	67.7	8,944,722	6,934,571	5,338,991	4,107,569
Dec.	608	348,746	9,669	383,213	57,439	55,826	25,215	94,486	25,866	259,368	65.7	123,845	86,132	72,988	68,702
12 mos.	608	4,042,296	107,228	4,467,631	573,912	730,717	292,705	1,094,117	248,238	2,941,604	65.8	1,526,027	1,007,116	919,772	
Lehigh Valley															
Dec.	1,354	2,828,411	241,596	3,315,814	144,930	560,763	102,998	1,464,916	137,573	2,427,566	73.2	888,248	838,369	742,265	291,062
12 mos.	1,353	34,462,892	2,468,176	39,866,526	2,960,674	7,232,181	1,307,943	17,606,844	1,611,228	30,921,804	67.7	8,944,722	6,934,571	5,338,991	4,107,569
Dec.	608	348,746	9,669	383,213	57,439	55,826	25,215	94,486	25,866	259,368	65.7	123,845	86,132	72,988	68,702
12 mos.	608	4,042,296	107,228	4,467,631	573,912	730,717	292,705	1,094,117	248,238	2,941,604	65.8	1,526,027	1,007,116	919,772	
Louisiana & Arkansas															
Dec.	255	60,309	341	63,665	4,318	8,768	4,616	20,995	5,209	41,219	64.7	22,446	23,171	15,948	2,712
12 mos.	255	889,579	4,664	952,999	200,205	111,543	54,663	320,381	59,227	735,283	77.2	217,216	188,596	23,878	—1,843
Dec.	5,051	4,670,419	527,733	5,727,464	567,086	1,179,416	180,909	2,107,362	265,849	4,337,601	75.7	1,389,863	1,192,463	1,204,342	1,092,712
12 mos.	5,062	59,129,377	5,306,214	69,962,668	8,273,526	14,668,292	1,966,905	24,649,911	3,374,157	53,330,788	76.2	16,631,880	12,793,456	12,967,297	11,857,688
Louisiana, Arkansas & Texas															
Dec.	255	60,309	341	63,665	4,318	8,768	4,616	20,995	5,209	41,219	64.7	22,446	23,171	15,948	2,712
12 mos.	255	889,579	4,664	952,999	200,205	111,543	54,663	320,381	59,227	735,283	77.2	217,216	188,596	23,878	—1,843
Dec.	5,051	4,670,419	527,733	5,727,464	567,086	1,179,416	180,909	2,107,362	265,849	4,337,601	75.7	1,389,863	1,192,463	1,204,342	1,092,712
12 mos.	5,062	59,129,377	5,306,214	69,962,668	8,273,526	14,668,292	1,966,905	24,649,911	3,374,157	53,330,788	76.2	16,631,880	12,793,456	12,967,297	11,857,688
Louisville & Nashville															
Dec.	1,046	740,790	72,859	920,868	99,025	134,398	10,033	337,940	38,854	619,986	67.3	300,882	254,662	215,917	98,707
12 mos.	1,048	8,932,794	920,585	10,931,066	1,665,784	1,737,545	123,207	4,027,010	440,172	8,000,144	73.2	2,930,922	2,356,015	1,838,070	1,933,102
Dec.	363	110,080	3,947	112,146	Cr. 3,368	11,748	2,290	29,111	7,944	35,758	31.9	68,526	58,612	27,588	
12 mos.	363	1,271,436	1,319,981	174,106	127,790	26,963	343,511	81,363	737,414	55.9	582,567	501,676	407,353	414,103	
Maine Central															
Dec.	1,046	740,790	72,859	920,868	99,025	134,398	10,033	337,940	38,854	619,986	67.3	300,882	254,662	215,917	98,707
12 mos.	1,048	8,932,794	920,585	10,931,066	1,665,784	1,737,545	123,207	4,027,010	440,172	8,000,144	73.2	2,930,922	2,356,015	1,838,070	1,933,102
Dec.	363	110,080	3,947	112,146	Cr. 3,368	11,748	2,290	29,111	7,944	35,758	31.9	68,526	58,612	27,588	
12 mos.	363	1,271,436	1,319,981	174,106	127,790	26,963	343,511	81,363	737,414	55.9	582,567	501,676	407,353	414,103	
Midland Valley															
Dec.	1,647	476,852	22,601	537,337	57,045	111,929	22,480	303,895	32,165	524,744	97.7	12,593	2,268	—22,375	54,949
12 mos.	1,632	6,860,995	182,592	7,514,180	1,089,135	1,521,784	264,908	3,558,928	401,900	6,823,401	90.8	690,779	349,276	40,723	281,705
Dec.	4,297	1,331,270	125,618	1,613,291	184,810	287,969	57,065	769,382	138,103	1,438,682	89.2	174,609	27,135	—81,114	223,290
12 mos.	4,302	19,359,259	1,128,772	22,371,582	2,911,538	4,007,745	687,471	9,107,376	1,426,360	18,203,607	81.4	4,167,975	2,772,439	1,243,926	1,016,850
Minneapolis & St. Louis															
Dec.	556	1,840,825	93,558	16,884	123,136	40,749	27,893	4,138	80,338	9,011	158,102	128.4	—34,966	—49,453	38,514
12 mos.	557	26,094	2,007	2,176,537	354,596	425,252	53,731	896,603	86,505	1,808,781	83.1	367,756	245,727	138,595	58,390
Dec.	163	425,680	18,961	33,307	7,143	5,906	1,775	21,159	5,353	39,603	118.9	—6,296	—8,575	—8,575	—1,875
12 mos.	163			504,160	128,540	67,428	226,874		54,341	498,207	98.8	—5,953	—29,265	—57,253	—97,804
Minn., St. Paul & S. S. Marie															
Dec.	556	1,840,825	93,558	16,884	123,136	40,749	27,893	4,138	80,338	9,011	158,102	128.4	—34,966	—49,453	38,514
12 mos.	557	26,094	2,007	2,176,537	354,596	425,252	53,731	896,603	86,505	1,808,781	83.1	367,756	245,727	138,595	58,390
Dec.	163	425,680	18,961	33,307	7,143	5,906	1,775	21,159	5,353	39,603	118.9	—6,296	—8,575	—8,575	—1,875
12 mos.	163			504,160	128,540	67,428	226,874		54,341	498,207	98.8	—5,953	—29,265	—57,253	—97,804
Duluth, South Shore & Atlantic															
Dec.	150	586,043	38,394	2,559	43,054	11,095	10,947	7,067	17,047	6,138	52,283	121.4	—9,229	—8,253	—9,831	—2,371
12 mos.	150	51,691	21,991	1,296	632,174	108,745	127,553	83,568	200,423	68,861	589,123	93.2	43,051	12,558	—18,437	—20,494
Dec.	364	825,702	15,722	58,949	922,581	12,893	7,361	3,555	24,307	5,272	53,380	90.6	5,569	3,804	—203	—2,269
12 mos.	364			922,581	209,563	116,617	40,001	318,934	51,920	736,777	79.9	185,804	166,511	63,322	53,062
Spokane International															
Dec.	150	586,043	38,394	2,559	43,054	11,095	10,947	7,067	17,047	6,138	52,283	121.4	—9,229	—8,253	—9,831	—2,371
12 mos.	150	51,691	21,991	1,296	632,174	108,745	127,553	83,568	200,423	68,861	589,123	93.2	43,051	12,558	—18,437	—20,494
Dec.	364	825,702	15,722	58,949	922,581	12,893	7,361	3,555	24,307	5,272	53,380	90.6	5,569	3,804	—203	—2,269
12 mos.	364			922,581	209,563	116,617	40,001	318,934	51,920	736,777	79.9	185,804	166,511	63,322	53,062
Mississippi Central															
Dec.	213	71,281	760	74,187	10,831	2,613	30,253	6,720	58,847	79.3	15,340	14,507	8,669	8,928
12 mos.	213	930,198	7,220	959,753	204,432	30,871	321,842	72,973	753,657	78.5	206,096	145,161	59,775	32,807
Dec.	3,293	1,504,068	203,745	1,977,932	264,927	110,168	784,838	178,345	1,771,573	89.6	206,359	148,069	—36,628	527,176
12 mos.	3,293	21,535,321	1,919,212	26,329,387	3,211,475	1,319,245	9,389,429	1,715,558	20,592,843	78.2	5,736,544	3,916,046	1,708,707	2,943,744	
Missouri & North Arkansas															
Dec.	213	71,281	760	74,187	10,831	2,613	30,253	6,720	58,847	79.3	15,340	14,507	8,669	8,928
12 mos.	213	930,198	7,220	959,753	204,432	30,871	321,842	72,973	753,657	78.5	206,096	145,161	59,775	32,807
Dec.	3,293	1,504,068	203,745	1,977,932	264,927	110,168	784,838	178,345	1,771,573	89.6	206,359	148,069	—36,628	527,176
12 mos.	3,293	21,535,321	1,919,212	26,329,387	3,211,475	1,319,245	9,389,429	1,715,558	20,592,843	78.2	5,736,544	3,916,046	1,708,707	2,943,744	
Missouri-Illinois															
Dec.	213	71,281	760	74,187	10,831	2,613	30,253	6,720	58,847	79.3	15,340	14,507	8,669	8,928
12 mos.	213	930,198	7,220	959,753	204,432	30,871	321,842	72,973	753,657	78.5	206,096	145,161	59,775	32,807
Dec.	3,293	1,504,068	203,745	1,977,932	264,927	110,168	784,838	178,345	1,771,573	89.6	206,359	148,069	—36,628	527,176
12 mos.	3,293	21,535,321	1,919,212	26,329,387	3,211,475	1,319,245	9,389,429	1,715,558	20,592,843	78.2	5,736,544	3,916,046	1,708,707	2,943,744	
Missouri-Kansas-Texas Lines															
Dec.	7,235	4,643,690	355,407	5,520,572	875,878	1,178,544	206,724	2,216,127	355,421	4,857,495	88.0	663,077	385,703	39,393	153,028
12 mos.	7,349	62,848,601	3,932,744	73,435,591	10,249,825	15,433,570	2,567,174	26,280,201	3,614,309	58,380,450	79.5	15,055,141	11,268,552	6,118,046	6,923,548
Dec.	1,763	715,588	41,999	827,612	163,249	145,037	40,032	247,863	62,591	658,853	79.61	168,759	139,937	63,633	166,103
12 mos.	1,764	8,702,985	407,040	9,834,123	1,532,747	1,766,916	498,336	2,989,722	623,256	7,400,449	75.25	2,433,674	1,888,720	900,076	345,477
Missouri Pacific															
Dec.	7,235	4,643,690	355,407	5,520,572	875,878	1,178,544	206,724	2,216,127	355,421	4,857,495	88.0	663,077	385,703	39,393	153,028
12 mos.	7,349	62,848,601	3,932,744	73,435,591	10,249,825	15,433,570	2,567,174	26,280,201	3,614,309	58,380,450	79.5	15,055,141	11,268,552	6,118,046	6,923,548
Dec.	1,763	715,588	41,999	827,612	163,249	145,037	40,032	247,863	62,591	658,853	79.61	168,759	139,937	63,633	166,103
12 mos.	1,764	8,702,985	407,040	9,834,123	1,532,747	1,766,916	498,336	2,989,722	623,256	7,400,449	75.25	2,433,674	1,888,720	900,076	345,477
Gulf Coast Lines															
Dec.	1,154	726,521	67,712	908,927	149,921	182,421	26,682	385,906	64,523	819,587	90.17	89,340	61,323	—30,192	41,280
12 mos.	1,158	10,651,083	652,769	12,575,330	1,618,501	2,082,787	328,626	4,635,869	611,108	9,387,108	74.65	2,777,381	1,370,550	1,518,751	
Dec.	316	57,163	3,187	72,211	13,619	11,063	3,798	26,515	5,593	60,492	83.8	11,719	12,485	—7,173	—1,294
12 mos.	316	924,396	34,007	1,048,269	199,381	112,051	48,619	313,484	57,646	729,740	69.6	318,529	278,368	34,040	—124,865
International-Great Northern															
Dec.	1,154	726,521	67,712	908,927	149,921	182,421	26,682	385,906	64,523	819,587	90.17	89,340	61,323	—30,192	41,280
12 mos.	1,158	10,651,083	652,769	12,575,330	1,618,501	2,082,787	328,626	4,635,869	611,108	9,387,108	74.65	2,777,381	1,370,550	1,518,751	
Dec.	316	57,163	3,187	72,211	13,619	11,063	3,798	26,515	5,593	60,492	83.8	11,719	12,485	—7,173	—1,294
12 mos.	316	924,396	34,007	1,048,269	199,381	112,051	48,619	313,484	57,646	729,740	69.6	318,529	278,368	34,040	—124,865
San Antonio, Uvalde & Gulf															
Dec.	1,201	572,317	36,915	649,473	115,930	165,528	40,471	290,334	51,801	664,676	102.3	—15,203	—2,107	—62,743	16,883
12 mos.	1,201	7,741,631	321,126	8,544,827	1,213,737	2,028,755	478,592	3,209,567	503,159	7,434,093	87.0	1,110,734	768,730	—30,048	177,587
Dec.	174	272,537	9,565	276,282	21,037	33,831	3,398	71,927	6,399	133,592	48.4	142,690	123,572	38,113	104,764
12 mos.	174	3,784,584	3,820,585	379,828	350,701	4,474	780,594	56,894	1,571,276	41.1	2,249,309	2,019,757	1,066,544	1,166,000	
Mobile & Ohio															
Dec.	1,201	572,317	36,915	649,473	115,930	165,528	40,471	290,334	51,801	664,676	102.3	—15,203	—2,107	—62,743	16,883
12 mos.	1,201	7,741,631	321,126	8,544,827	1,213,737	2,028,755	478,592	3,209,567	503,159	7,434,093	87.0	1,110,734	768,730	—30,048	177,587
Dec.	174	272,537	9,565	276,282	21,037	33,831	3,398	71,927	6,399	133,592	48.4	142,690	123,572	38,113	104,764
12 mos.	174	3,784,584	3,820,585	379,828	350,701	4,474	780,594	56,894	1,571,276	41.1	2,249,309	2,019,757	1,066,544	1,166,000	
Monongahela															

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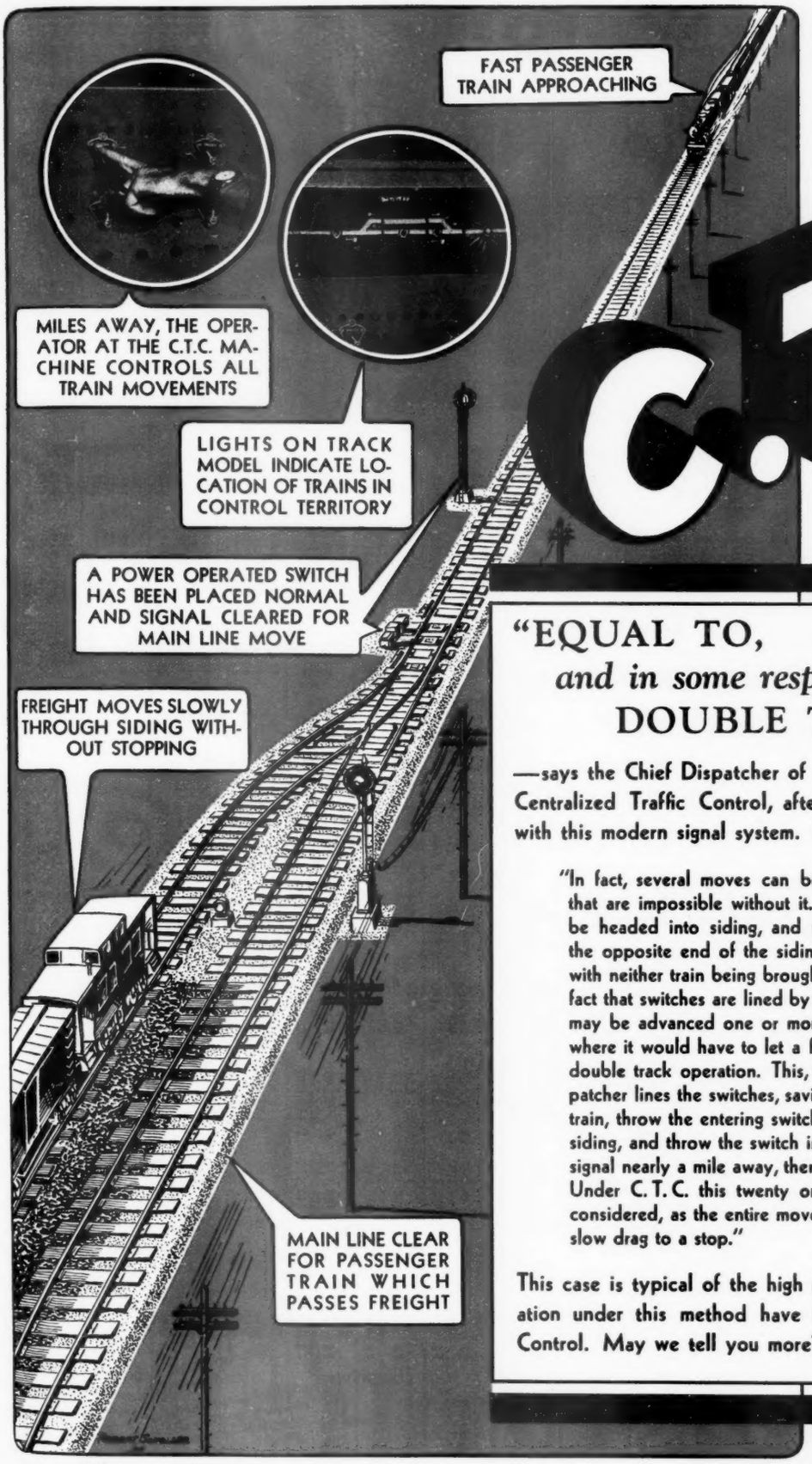
FAST PASSENGER TRAIN APPROACHING
MILES AWAY, THE OPERATOR AT THE C.T.C. MACHINE CONTROLS ALL TRAIN MOVEMENTS
LIGHTS ON TRACK MODEL INDICATE LOCATION OF TRAINS IN CONTROL TERRITORY
A POWER OPERATED SWITCH HAS BEEN PLACED NORMAL AND SIGNAL CLEARED FOR MAIN LINE MOVE
FREIGHT MOVES SLOWLY THROUGH SIDING WITHOUT STOPPING
MAIN LINE CLEAR FOR PASSENGER TRAIN WHICH PASSES FREIGHT
C.T.C.

"EQUAL TO, *and in some respects better than,* DOUBLE TRACK"—

—says the Chief Dispatcher of a railroad, referring to "Union" Centralized Traffic Control, after nearly five years experience with this modern signal system. Continuing, he says:

> "In fact, several moves can be made with this equipment that are impossible without it. For instance, one train may be headed into siding, and while this train is drifting to the opposite end of the siding, a faster train may pass it, with neither train being brought to a stop. Also, due to the fact that switches are lined by the dispatcher, a heavy freight may be advanced one or more stations beyond the point where it would have to let a faster train by under ordinary double track operation. This, due to the fact that the dispatcher lines the switches, saving the time necessary to stop train, throw the entering switch, start the train and pull into siding, and throw the switch in order to clear the automatic signal nearly a mile away, then wait for the fast train to pass. Under C. T. C. this twenty or more minutes need not be considered, as the entire move is made without bringing the slow drag to a stop."

This case is typical of the high regard those directing train operation under this method have for "Union" Centralized Traffic Control. May we tell you more? No obligation. » » »

870

1881 **Union Switch & Signal Co.** 1935

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1934—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Maintenance of: Way and structures	Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1933
Montour	Dec.	57	$120,330	.....	$121,114	$8,688	$30,355	$806	$32,668	$6,598	$79,115	65.3	$41,999	$29,502	$52,323	$28,264
	12 mos.	57	1,856,017	$11	1,862,602	151,017	500,142	11,665	396,063	75,630	1,134,517	60.9	728,085	558,039	774,331	722,516
Nashville, Chattanooga & St. Louis	Dec.	1,203	753,800	82,565	965,939	99,146	247,488	54,615	427,197	56,515	892,595	92.4	73,344	43,340	20,639	65,811
	12 mos.	1,203	10,507,806	884,604	12,733,702	1,664,934	2,958,770	656,190	5,030,588	674,526	11,048,705	86.8	1,684,997	1,245,086	953,544	992,602
Nevada Northern	Dec.	165	17,607	1,080	23,324	9,547	3,877	580	7,730	3,690	25,424	109.0	—2,100	—7,260	—683	1,692
	12 mos.	165	293,104	11,105	353,606	104,979	40,298	8,373	86,567	43,223	283,440	80.1	70,166	—11,386	36,401	—36,495
New York Central	Dec.	11,401	16,219,915	5,299,767	24,632,289	3,115,249	4,870,060	521,097	9,518,769	1,033,282	19,443,966	78.9	5,188,323	3,262,673	1,566,733	2,233,395
	12 mos.	11,401	204,155,074	54,752,612	295,084,881	31,151,296	60,602,169	6,278,976	109,967,952	12,147,045	224,171,760	76.0	70,913,121	45,888,859	29,151,703	33,269,162
Pittsburgh & Lake Erie	Dec.	233	984,263	52,514	1,075,126	25,319	445,362	27,466	409,744	67,719	982,841	91.4	92,285	170,111	318,563	163,011
	12 mos.	233	14,184,311	561,716	15,236,943	1,294,202	5,205,515	297,276	5,208,455	775,806	12,860,601	84.4	2,376,342	1,566,647	3,304,833	2,906,119
New York, Chicago & St. Louis	Dec.	1,691	2,449,333	70,605	2,610,776	247,407	397,977	102,527	1,013,790	133,173	1,893,340	72.5	717,436	701,239	444,467	409,712
	12 mos.	1,691	31,087,824	909,186	33,143,864	3,511,252	4,889,700	1,205,126	11,636,920	1,474,322	22,692,256	68.5	10,451,608	8,770,784	5,509,427	5,216,887
New York, New Haven & Hartford	Dec.	2,068	3,037,578	2,005,598	5,773,870	474,276	946,456	82,415	2,336,421	322,740	4,307,687	74.6	1,466,183	1,058,340	501,421	615,424
	12 mos.	2,069	39,400,842	21,638,295	69,283,110	7,867,558	12,191,272	889,726	26,954,430	3,250,885	52,714,212	76.1	16,568,898	12,036,425	5,617,020	7,695,427
New York Connecting	Dec.	20	218,734	.....	229,676	16,823	5,058	.....	31,618	1,103	54,602	23.8	175,074	141,421	134,435	40,836
	12 mos.	20	2,559,565	.....	2,700,496	155,580	85,236	.....	337,552	12,541	590,909	21.9	2,109,587	1,708,804	1,263,624	1,261,009
New York, Ontario & Western	Dec.	568	631,035	17,185	709,235	59,688	101,172	10,854	298,017	Cr. 2,410	473,178	66.7	236,057	263,558	213,580	152,011
	12 mos.	568	8,148,080	408,460	9,389,831	1,096,481	1,667,729	137,444	3,851,756	298,033	7,088,041	75.5	2,301,790	1,860,614	1,252,077	1,708,812
Norfolk & Western	Dec.	2,185	5,462,750	174,933	5,842,741	627,417	1,083,903	114,755	1,392,114	287,548	3,529,259	60.4	2,313,482	1,839,709	2,023,318	2,274,740
	12 mos.	2,185	68,617,070	1,780,032	72,707,867	7,633,685	16,043,045	1,360,071	16,551,259	2,783,879	44,531,257	61.2	28,176,610	20,397,946	22,518,286	24,656,354
Norfolk Southern	Dec.	932	288,863	10,888	322,130	53,459	48,924	21,102	125,436	27,357	275,972	85.7	46,158	30,227	9,648	74,066
	12 mos.	932	4,419,047	122,762	4,763,117	803,186	594,190	235,452	1,689,351	301,258	3,623,131	76.1	1,139,986	824,569	489,653	303,231
Northern Pacific	Dec.	6,722	3,050,796	337,231	3,806,986	324,631	634,757	127,557	1,599,234	347,458	3,090,421	81.2	716,565	678,002	944,611	998,823
	12 mos.	6,724	43,205,825	3,362,558	51,407,775	5,494,005	10,686,932	1,731,882	19,386,074	3,538,951	41,550,813	80.8	9,856,962	4,527,795	7,915,209	5,975,973
Northwestern Pacific	Dec.	375	98,953	75,170	206,767	34,986	25,327	3,315	135,149	5,786	204,341	98.8	2,426	—12,845	—20,774	20,238
	12 mos.	384	1,876,751	953,195	3,218,672	468,595	544,170	49,728	1,673,218	170,460	2,903,881	90.2	314,791	121,680	—8,010	—180,606
Oklahoma City-Ada-Atoka	Dec.	132	28,094	470	30,351	3,741	4,123	619	10,750	2,077	21,292	70.2	9,059	6,425	—829	—5,963
	12 mos.	132	315,889	4,286	341,625	57,894	25,673	7,942	123,080	20,942	234,822	68.7	106,803	72,469	—10,377	—21,665
Pennsylvania	Dec.	10,511	18,819,214	5,066,206	26,911,060	2,076,698	5,220,596	554,696	10,177,158	1,911,776	20,209,468	75.1	6,701,592	5,418,272	4,815,818	3,680,625
	12 mos.	10,511	251,229,985	57,740,587	343,668,699	30,288,323	66,059,375	6,793,672	122,719,249	19,070,616	248,786,108	72.4	94,882,591	71,015,179	61,317,016	61,976,859
Long Island	Dec.	396	474,305	1,315,452	1,952,676	130,262	297,388	11,457	655,915	84,994	1,180,021	60.4	772,655	613,263	434,812	493,849
	12 mos.	396	5,750,730	17,230,719	24,227,481	2,013,387	3,734,513	172,054	10,412,005	811,815	17,146,582	70.8	7,080,899	4,475,781	2,372,922	4,230,658
Pennsylvania-Reading Seashore Lines	Dec.	411	240,264	124,232	382,257	38,713	73,048	9,439	256,658	25,516	403,582	105.6	—21,325	—79,142	—144,878	—280,961
	12 mos.	411	2,788,987	2,653,208	5,744,454	504,575	895,496	112,815	3,642,403	352,048	5,502,410	95.8	242,044	—739,622	—1,924,913	—1,504,069
Pere Marquette	Dec.	2,185	1,780,425	66,609	1,947,157	215,437	450,511	58,211	779,604	84,818	1,592,253	81.8	354,904	268,878	128,583	239,329
	12 mos.	2,196	22,473,175	746,381	24,597,190	2,909,362	5,368,257	699,496	9,347,759	1,056,655	19,425,960	79.0	5,171,230	3,992,733	2,618,368	1,724,456
Pittsburg & Shawmut	Dec.	101	49,722	438	50,789	15,190	20,694	1,303	16,760	5,736	59,683	117.5	—8,894	—9,882	—5,887	12,889
	12 mos.	102	628,531	5,233	642,980	121,140	211,960	16,042	200,039	44,821	594,002	92.4	48,978	39,924	94,516	126,743
Pittsburgh & West Virginia	Dec.	138	193,293	.....	204,373	17,548	50,828	13,104	49,924	17,268	158,023	77.3	46,350	34,667	52,974	48,429
	12 mos.	138	2,595,547	.....	2,720,145	263,058	715,128	167,533	577,507	180,314	2,003,045	73.6	717,100	474,197	835,969	904,838
Pittsburg, Shawmut & Northern	Dec.	193	77,740	288	80,233	10,144	16,586	1,237	31,001	8,430	67,398	84.0	12,835	11,739	4,441	—7,666
	12 mos.	195	889,515	2,148	921,045	211,395	228,903	15,436	344,725	84,162	884,621	96.0	36,424	10,697	—57,694	90,624
Reading	Dec.	1,460	3,826,082	272,771	4,370,977	241,141	811,986	70,557	1,674,541	287,679	3,109,936	71.1	1,261,041	1,036,762	1,083,651	1,096,936
	12 mos.	1,461	47,444,459	2,958,626	53,078,431	3,844,950	9,548,329	858,038	19,752,806	2,669,800	36,885,154	69.5	16,193,277	12,581,455	12,856,973	13,577,068
Richmond, Fredericksburg & Potomac	Dec.	117	240,696	171,704	577,219	47,935	124,896	9,063	174,006	41,760	405,052	70.2	172,167	155,962	132,196	—10,858
	12 mos.	117	3,208,969	1,553,061	6,128,701	630,100	1,366,617	100,072	2,403,429	406,287	5,012,368	81.8	1,116,333	824,875	443,987	393,220
Rutland	Dec.	413	155,419	29,339	249,222	21,628	63,147	10,244	127,352	14,529	233,043	93.5	16,179	1,168	8,699	20,388
	12 mos.	413	2,156,976	389,910	3,248,406	550,097	676,666	125,255	1,558,257	165,872	3,071,677	94.6	176,729	—59,262	—13,810	286,750
St. Louis San Francisco	Dec.	5,092	2,382,285	253,565	2,936,042	495,455	840,889	97,758	1,188,941	212,697	2,844,703	96.9	91,339	—35,796	—49,290	126,484
	12 mos.	5,145	34,002,932	2,473,985	40,043,864	6,715,152	9,510,470	1,142,459	14,341,414	2,094,077	33,823,323	84.5	6,220,541	3,262,648	2,934,814	3,381,153
Fort Worth & Rio Grande	Dec.	233	30,698	1,117	38,354	14,988	10,594	3,002	21,051	6,021	55,528	144.8	—17,174	—21,539	—26,516	—25,716
	12 mos.	233	373,557	14,323	469,666	154,535	124,036	29,104	263,496	53,065	624,041	132.9	—154,375	—202,475	—269,224	—393,536
St. Louis, San Francisco & Texas	Dec.	261	56,041	684	60,275	32,917	17,816	3,946	27,741	8,725	90,387	150.0	—30,112	—32,391	—58,614	—39,559
	12 mos.	261	890,094	7,141	936,703	361,114	192,320	53,491	413,730	99,882	1,118,497	119.4	—181,794	—227,108	—531,632	—354,114
St. Louis Southwestern Lines	Dec.	1,786	882,771	22,124	961,927	136,636	171,749	70,376	399,856	25,782	810,524	84.3	151,403	92,543	9,521	123,099
	12 mos.	1,827	13,236,491	213,938	14,125,660	1,507,456	2,034,065	817,216	4,717,391	742,306	9,891,149	70.0	4,234,511	3,393,392	1,958,645	1,789,740
San Diego & Arizona Eastern	Dec.	155	18,328	3,800	25,256	11,449	9,449	1,675	20,811	3,011	46,926	185.8	—21,670	—23,990	—22,297	—9,876
	12 mos.	155	368,031	51,108	436,497	119,757	106,261	19,771	199,703	50,610	502,849	115.2	—66,352	—91,346	—74,229	—61,946
Seaboard Air Line	Dec.	4,307	2,179,906	428,656	2,963,610	448,536	598,752	143,026	1,077,616	190,900	2,480,457	83.7	483,153	359,877	244,108	337,931
	12 mos.	4,309	26,834,794	3,446,873	33,861,442	5,680,979	7,088,190	1,589,712	12,249,918	1,848,579	28,814,732	85.1	5,046,710	2,810,525	1,631,913	2,622,093

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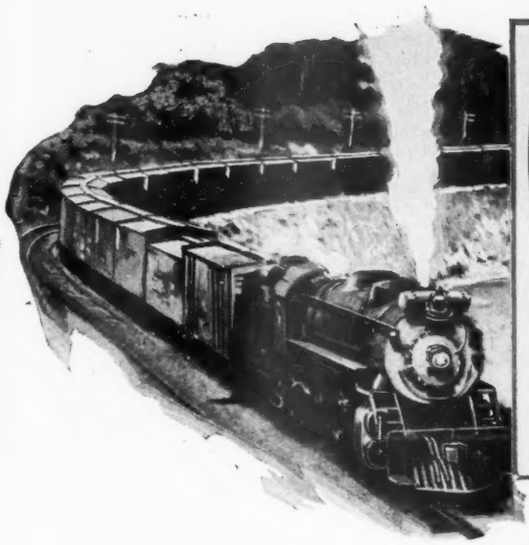

Better Performance Lower Costs

HUNT-SPILLER *Air Furnace* GUN IRON has kept pace with the constantly increasing requirements for locomotive materials.

The service insured by its wear-resisting qualities is becoming more important to economical operation with each stage of locomotive development.

Most of the leading railroads are applying HUNT-SPILLER *Air Furnace* GUN IRON wearing parts on their locomotives to maintain the new standards of efficient performance and insure minimum operating costs.

Locomotives completely equipped with the parts listed below give less trouble on the road, consume less fuel and cost less to maintain.

HSGI
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Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
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Crosshead Shoes
Hub Liners
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Parts Finished For Application

Dunbar Sectional Type Packing
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HUNT-SPILLER *Air Furnace* GUN IRON

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1934—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income	Net ry. operating income, 1933
Southern Railway	Dec.	6,644	$4,878,123	$854,338	$6,434,076	$528,847	$1,080,112	$152,944	$2,433,553	Cr.$281,106	$3,959,614	61.5	$2,474,462	$2,223,685	$2,030,602	$1,408,294
	12 mos.	6,644	62,833,894	8,003,502	78,183,701	9,935,749	14,481,234	1,690,128	28,637,993	2,902,006	58,120,444	74.3	20,063,257	14,861,536	12,665,358	15,015,944
Alabama Great Southern	Dec.	315	291,281	53,017	381,096	53,328	78,277	12,155	139,313	Cr.14,416	271,472	71.2	109,624	101,991	95,879	132,618
	12 mos.	315	3,954,780	521,211	4,888,350	871,435	1,088,273	129,885	1,618,400	169,763	3,907,283	79.9	981,067	701,872	661,908	661,538
Cinn., New Orleans & Texas Pacific	Dec.	336	772,652	86,323	937,143	106,460	182,993	24,632	268,732	Cr.28,382	559,599	59.7	377,544	357,260	340,473	210,492
	12 mos.	336	10,716,653	807,370	12,272,002	1,598,479	2,256,821	289,950	3,209,659	428,360	7,836,848	63.9	4,435,154	3,702,373	3,257,307	3,354,223
Georgia Southern & Florida	Dec.	397	86,828	32,393	141,259	Cr.4,766	27,690	1,619	65,984	Cr.10,762	82,085	58.1	59,174	57,077	62,548	50,748
	12 mos.	397	1,298,517	321,388	1,841,007	318,511	431,995	19,680	829,320	29,880	1,655,555	89.9	185,452	43,496	115,243	38,440
New Orleans & Northeastern	Dec.	204	129,960	21,769	168,644	22,130	25,722	5,910	56,172	Cr.6,222	105,309	62.4	63,335	43,621	29,899	20,257
	12 mos.	204	1,799,937	220,425	2,195,949	309,989	396,785	66,868	763,946	99,935	1,654,778	75.4	541,171	256,865	81,609	—182,615
Northern Alabama	Dec.	99	42,079	2,190	45,994	3,549	1,317	951	16,011	Cr.1,499	20,329	44.2	25,665	24,716	24,620	19,650
	12 mos.	99	502,726	20,612	543,739	117,399	18,242	13,646	184,534	19,600	352,568	64.8	191,171	154,091	41,761	8,708
Southern Pacific	Dec.	8,792	6,119,822	1,608,399	8,776,192	940,912	1,364,224	297,261	3,444,288	246,129	6,488,249	73.9	2,287,943	1,640,498	1,369,933	1,125,492
	12 mos.	8,832	85,757,493	16,009,009	112,918,817	11,045,569	18,881,621	3,311,585	40,002,273	6,391,084	81,743,959	72.4	31,174,858	21,660,054	17,581,796	9,735,941
Southern Pacific Steamship Lines	Dec.	...	283,604	4,767	306,331	13,246	62,476	15,729	242,023	6,330	339,804	110.9	—33,473	—34,044	—34,176	—101,610
	12 mos.	...	4,072,885	174,949	4,402,029	182,667	1,249,632	194,435	3,312,560	230,774	5,170,068	117.4	—768,039	—775,522	—770,255	—486,424
Texas & New Orleans	Dec.	4,445	2,044,339	268,888	2,663,639	277,229	473,279	114,969	964,189	105,199	1,954,885	73.4	708,754	524,148	362,535	48,889
	12 mos.	4,463	25,408,818	2,545,389	31,871,862	4,757,846	6,955,114	1,336,107	11,073,320	2,393,118	26,665,188	83.7	5,206,674	2,462,792	192,117	—192,443
Spokane, Portland & Seattle	Dec.	552	299,448	32,297	372,488	27,997	39,466	5,353	127,497	22,588	225,171	60.5	147,317	203,175	197,401	401,363
	12 mos.	552	4,772,145	463,092	5,671,051	489,796	713,019	70,226	1,747,894	207,472	3,253,037	57.4	2,418,014	1,851,074	1,540,713	1,207,741
Tennessee Central	Dec.	287	156,097	5,636	172,847	27,187	27,288	5,242	59,084	13,103	131,898	76.3	40,949	36,173	22,512	17,129
	12 mos.	287	1,921,640	63,067	2,106,812	340,419	308,874	61,900	706,710	138,747	1,554,997	73.8	551,815	499,977	335,407	266,299
Texas & Pacific	Dec.	1,949	1,362,135	194,987	1,788,777	187,934	341,035	63,735	579,625	126,807	1,317,255	73.6	471,522	411,716	390,179	585,540
	12 mos.	1,950	17,777,334	1,916,115	22,289,956	2,305,458	3,825,446	764,426	6,584,468	1,438,170	15,110,841	67.8	7,179,115	5,961,064	4,732,752	3,942,553
Texas Mexican	Dec.	162	94,042	286	102,331	11,839	16,847	2,954	30,711	6,763	68,805	67.2	33,526	30,672	23,032	—2,570
	12 mos.	162	889,818	4,650	983,400	130,300	147,764	35,834	335,947	84,069	732,218	74.5	251,182	200,829	144,796	—116,150
Toledo, Peoria & Western	Dec.	239	120,424	8	122,337	23,152	514	13,881	38,735	11,006	87,288	71.4	35,049	25,749	13,205	—33,916
	12 mos.	239	1,692,142	162	1,718,163	428,246	135,919	176,760	487,367	109,079	1,337,371	77.8	380,792	313,721	138,055	185,841
Union Pacific	Dec.	3,767	4,253,113	470,158	5,328,338	360,146	1,175,618	116,556	1,821,384	342,730	3,890,754	73.0	1,437,584	1,223,136	920,039	1,487,046
	12 mos.	3,767	56,159,406	5,200,896	67,490,849	5,843,543	14,722,474	1,371,493	20,477,420	3,594,823	46,901,763	69.5	20,589,086	15,321,496	11,585,526	14,246,901
Oregon Short Line	Dec.	2,504	1,517,308	123,543	1,782,310	117,170	274,319	28,172	597,615	116,895	1,152,044	64.6	630,266	400,702	303,657	280,827
	12 mos.	2,504	18,660,667	1,217,558	21,455,911	2,296,550	3,360,843	367,073	6,809,360	1,201,786	14,368,126	67.0	7,087,785	4,333,988	3,248,961	3,301,980
Oregon-Washington R. R. & Nav. Co.	Dec.	2,293	915,126	137,218	1,179,637	168,726	162,999	45,258	483,290	110,750	977,756	82.9	201,881	123,033	22,596	—47,827
	12 mos.	2,294	12,420,438	1,270,724	15,284,427	2,579,283	2,080,780	559,309	5,546,603	1,118,228	11,962,738	78.3	3,321,689	1,780,907	548,057	—392,843
Los Angeles & Salt Lake	Dec.	1,234	1,050,810	140,954	1,334,947	141,511	192,734	45,332	412,803	68,612	892,179	66.8	442,768	338,108	228,652	89,818
	12 mos.	1,237	13,311,301	1,550,722	16,206,311	1,703,559	2,318,880	520,259	4,691,401	725,826	10,334,776	63.8	5,871,535	4,476,646	3,061,840	1,591,090
St. Joseph & Grand Island	Dec.	258	186,664	2,515	195,463	24,654	20,821	2,138	72,525	14,505	135,064	69.1	60,399	70,127	42,163	62,066
	12 mos.	258	2,745,997	23,927	2,851,526	433,642	304,477	26,156	863,513	149,261	1,786,225	62.6	1,065,301	925,046	528,350	621,493
Utah	Dec.	111	109,825	.....	110,258	8,931	4,626	449	20,962	2,012	36,980	33.5	73,278	53,646	45,355	10,718
	12 mos.	111	733,187	.....	735,800	122,869	190,376	6,195	169,805	56,746	545,991	74.2	189,809	79,405	—35,184	61,314
Virginian	Dec.	619	1,201,563	5,197	1,265,512	83,032	187,341	16,520	227,896	37,998	552,496	43.7	713,016	553,016	627,211	589,448
	12 mos.	619	13,814,095	57,024	14,443,351	1,165,627	2,443,014	197,328	2,539,896	363,608	6,701,874	46.4	7,741,477	6,006,128	6,772,558	6,116,664
Wabash	Dec.	2,447	2,627,658	240,133	3,100,337	320,045	454,981	128,729	1,252,922	193,092	2,340,055	75.5	760,282	748,912	431,477	512,012
	12 mos.	2,455	33,569,924	2,127,900	38,235,813	4,621,032	5,978,723	1,585,433	14,492,651	1,798,962	28,523,481	74.6	9,712,332	8,378,441	4,355,273	2,745,490
Ann Arbor	Dec.	293	242,943	4,016	255,254	19,744	39,229	10,452	121,522	16,000	207,005	81.1	48,249	45,529	29,231	11,137
	12 mos.	293	3,154,556	36,054	3,307,260	291,152	583,171	129,408	1,416,138	153,131	2,574,839	77.9	732,421	600,810	374,659	220,246
Western Maryland	Dec.	883	1,102,704	7,028	1,142,835	114,100	240,984	34,246	310,222	40,315	742,897	65.0	399,938	371,265	375,891	403,772
	12 mos.	888	13,408,910	100,559	13,883,275	1,863,418	3,026,056	417,145	3,589,708	516,768	9,444,083	68.0	4,439,192	3,720,519	4,106,178	4,060,202
Western Pacific	Dec.	1,213	881,079	24,099	957,780	114,168	149,805	52,183	361,028	61,843	769,143	80.3	188,637	137,084	78,869	93,110
	12 mos.	1,213	11,292,542	288,513	12,302,903	1,898,165	1,906,951	643,267	4,332,186	602,216	9,780,792	79.5	2,522,111	1,724,340	1,267,422	905,827
Wheeling & Lake Erie	Dec.	511	886,337	2,074	931,106	52,285	208,360	29,563	279,115	43,271	611,934	65.7	319,172	362,870	347,745	61,322
	12 mos.	511	10,569,728	18,517	11,239,794	1,070,410	3,270,917	343,646	3,411,510	410,826	8,504,960	75.7	2,734,834	1,909,465	1,764,829	1,651,357
Wichita Falls & Southern	Dec.	203	29,862	100	33,858	8,073	6,218	2,196	13,850	4,125	34,462	101.78	—604	7,104	4,174	15,581
	12 mos.	203	450,591	925	508,795	106,309	77,398	21,427	155,314	43,104	403,552	79.32	105,243	80,399	47,951	100,487